# Origins 60

- Christian Beliefs
  A response to Professor John Lloyd 04
- Gender and Sex
  "The queen of problems in evolutionary biology" 08
- A review of the paradigm shift in archaeology 14
- Did God create diseases? 20
- Types of animal forms
  Evidence from nature 26

The Journal of **The Biblical Creation Society**

# Origins 60

## Guest Editorial:

It was some 28 years ago that I originally took up the reins as editor of *Origins,* introducing a new format successor to *Biblical Creation*. I do not think anyone envisaged at that time that creation could become a political issue, with a government legislating to suppress its teaching in schools. On one hand this is a measure of the raised profile of the subject and the fact that it is considered important enough to need the weight of government to stamp it out. Perhaps we should be grateful to Prof. Dawkins for the publicity. On the other hand it illustrates very clearly that it is a core issue at the heart of the spiritual battle that we engaged in, and that it is not a dispute about facts or evidence, but a struggle to capture hearts and minds.

This is one thing that has become ever more clear over the years: the evidence is overwhelmingly in favour of special creation as described in scripture. Even some who had been our opponents (such as Anthony Flew) have been forced to concede that this evidence from the natural world – and from philosophical considerations – points inexorably in one direction. Several of the articles in this edition refer to this truth. It is not that man *cannot* believe the truth, but that he *will* not believe. Paul states as much bluntly 'men .. suppress the truth by their wickedness, since what may be known about God is plain to them, because God has made it plain to them. For since the creation of the world God's invisible qualities – his eternal power and divine nature – have been clearly seen, being understood from what has been made, so that men are without excuse.' (Romans 1:18–20) We have never had less reason to be apologetic about God's truth, specifically about early history – creation, fall and flood – and never had better reason to boldly proclaim it, being fully consistent with the testimony around us – the testimony both of the past and the present.

John Peet expressed very similar views in his editorial in *Origins 59,* and referred to the Intelligent Design movement. I can't help but feel the name is tautological – Design cannot be 'unintelligent' in the sense of being purposeless and not directed by an intelligent agent, as this is the very essence of what is meant by design. It is interesting to see how frequently evolutionists will refer to such things as 'the beauty of design' in nature programmes: they just cannot avoid what is staring them in the face. (A recent TV trailer for a programme on the origins of the solar system stated 'New discoveries make the creation of the earth an even greater miracle'). To then attribute such 'design' to nothing but random, purposeless chance is to deny what they have just asserted. How is it that they cannot see it? Surely this is where 'the god of this age has blinded the minds of unbelievers' (2 Cor. 4:4). Even if one rose from the dead and went back to tell them, they still wouldn't believe! (ref. Luke 16:31)

This has been testified by those who would never be considered creationists. It was over 30 years ago that Fred Hoyle (who was most dismissive of creationists) said 'The chance that higher life forms might have emerged in this way is comparable with the chance that a tornado sweeping through a junk-yard might assemble a Boeing 747 from the materials therein.' Even more explicitly, he also said 'Once we see, however, that the probability of life originating at random is so utterly miniscule as to make it absurd, it becomes sensible to think that the favourable properties of physics on which life depends are in every respect deliberate … . It is therefore almost inevitable that our own measure of intelligence must reflect … higher intelligences … even to the limit of God … such a theory is so obvious that one wonders why it is not widely accepted as being self-evident. The reasons are psychological rather than scientific.' Absolutely – just as Paul said 2,000 years earlier, quoted above.

The process of deciphering the DNA code is also revealing the amazing sophistication of the genetic language (see Sylvia Baker's article in *Origins 59*). The idea that most DNA is 'junk' is laughable and would not have been entertained had those proposing the idea not been so arrogant and ignorant. All the components of a complex human language are there in the code – punctuation, words, sentences, conjunctions, conditionality. Evolutionists have often speculated as to the origins of physical features, but the origin of information is surely an evolutionary dead end. The very nature of information is that it is not information if the language is incomprehensible. There has to be a 'prior arrangement' between an intelligent sender and an intelligent receptor, both as to the coding mechanism and the meaning of the message. Can we imagine two telephones, a connecting wire, and a comprehensive language understood by both parties all appearing instantaneously by chance (for all these elements would be required to transmit one simple piece of information)? Even could we envisage such a miracle, it would need an intelligent agent to create information that would use those tools. DNA/RNA and all the sophisticated

(Continued on page 30)

# Contents

Origins 60: December 2015

04 **Christian beliefs about biological origins: a response to Professor John Lloyd**
*Sylvia Baker*
A response to the paper by Professor Lloyd which set out to deal fairly and to respect the three views of origins, Theistic Evolution, Intelligent Design and Young-earth Creationism.

08 **Gender and Sex**
*J H John Peet*
Fundamental to survival but evolutionists admit their inability to explain the origins of sex. This article looks at the processes involved so we can consider if these could have originated by chance.

14 **A review of the paradigm shift in archaeology**
*James Powell*
This article examines the shift in archaeological thought from human origins from thousands of years to millions of years ago.

20 **Diseases and Illnesses – did God create them?**
*Nancy Darrall*
Did God create diseases such as malaria? This article looks at evidence from DNA to refute such an assumption.

26 **Types of Animal Form**
*Lindsay Thompson*
Evidence-based reasoning points to the sudden appearance of complex animal forms. This is consistent with the biblical account.

**Cover photograph:**
Teacher with primary school children in biology lesson.
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# Christian Beliefs about Biological Origins: a Response to Professor John Lloyd

Sylvia Baker

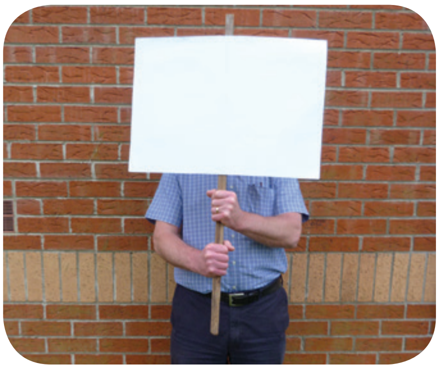
## Abstract

In an impressive and well-argued paper, Professor John Lloyd has maintained that subjective judgements account for the differences between Christians who take conflicting positions within the creation/evolution debate. My paper proposes, however, that it is possible to identify more fundamental differences between the various approaches to the controversy. While there is value in the analysis which Lloyd provides, my paper will argue for a more foundational approach, one which acknowledges the importance of historical and philosophical factors in the journey to the current adversarial situation. In doing so, it will also attempt to throw further light on the basis of the Intelligent Design position.

## Introduction

John Lloyd (2014) has provided an original contribution to the published material concerning the creation/evolution debate which has much to commend it. Written in an irenic spirit, it attempts to deal fairly with the different positions taken by Christians on this contentious subject. It is clear that Lloyd is aiming to provide an accurate picture of each of the three main positions, Young-earth Creationism, Intelligent Design and Theistic Evolution, and this in itself sets his publication apart from many others that have been published in this field (Baker 2014, 2012a,b) . He advocates that the holders of each position should be respected rather than vilified and that they should seek to understand each other better. This is a very welcome repositioning of the debate.

The debate regarding creation and evolution is a topic of immense current significance in which it is particularly important to get the facts right. In the field of education, the British Humanist Association has orchestrated a successful campaign, *Teach evolution, not creationism,* as stated openly on their website (evolutionnotcreationism.org.uk, accessed 26 January 2015):


Man demonstrating for freedom of speech. © NMD

> We're very pleased to announce that as of 2014, the aims of this campaign have largely been met. In June 2014, the Government updated its Free Schools and Academies funding agreements to require all such schools to teach evolution, and to preclude the teaching of creationism as science. It also clarified that the same requirements were implicit for all English state schools through the requirement that they teach a 'broad and balanced' curriculum. In August 2014, the Government announced it would close the loophole which allowed creationist private schools to receive state funds through a nurseries scheme. And finally in September 2014, a module on evolution was added to the national curriculum in primary schools, meaning that all English state-funded schools from primary level onwards must teach evolution, and not creationism. We're absolutely delighted that this campaign has been a success and would like to thank all our supporters for making this happen.

It is extraordinary that such a campaign, one which aims to close down debate and limit freedom of expression by governmental decree, should so easily achieve its objectives in a country such as the UK which places a high value on the notions of freedom of speech and of the pursuit of scientific integrity. Currently, as a result of this campaign, it is considered illegal to challenge Darwinian evolution in any way in a state-funded school, as any challenge on the basis of the scientific evidence is immediately dismissed as "creationism". It is worth noting that in accepting the aims of the BHA campaign, the Government at no point consulted with creationists to ascertain whether or not their position was being fairly represented, a point which has been established by "Freedom of Information" requests, the replies to which I have seen personally. Thus, the pressure from the BHA, together with others who are like-minded, has been accepted uncritically by the Government who have now decreed that naturalism should be the lens through which the subject of origins is viewed by the nations' school children, including those who are of a very young age.

This, then, is not a minor issue, but one which can have profound consequences, and Professor Lloyd's publication makes an informed and fair-minded contribution to a debate that is often conducted on the basis of ignorance and prejudice. Nevertheless, there is more to be said; the proponents of the different positions will not be inclined to take the wise advice that he offers them if they consider that the very foundation of their position is not sufficiently understood. Subsequent sections of this paper will seek to elucidate this problem.

## The foundational concept at the root of Intelligent Design

Professor Lloyd refers to Intelligent Design (ID) as a negative creed (p298) and is particularly critical of the place that it gives to the concept of irreducible complexity (pp297 and 300). Indeed, in his final summing up on p301, that concept seems to be regarded as that which defines ID:

> [A]dvocates of Intelligent Design should admit that their scepticism about the adequacy of current scientific accounts of origins does not justify an insistence that convincing explanations will never be found.

While it is certainly true that the concept of irreducible complexity is an important strand within ID, it is not the concept upon which the position rests. Far more foundational, and of a completely different nature, is the concept of *specified complexity*. Put simply, Intelligent Design theorists argue that it is possible to know when something is designed. They are arguing positively, not negatively. Their position is not that there are gaps in our knowledge which at the moment we need to invoke God to fill; it is the exact reverse. Intelligent Design theory argues that living organisms, together with other features of the Universe, portray irrefutable evidence of intelligence. The onus, according to ID, is on those who would deny the existence of a Designer to explain the existence of complex and specified information within every living thing.

The Center for Science and Culture based at the Discovery Institute in Seattle is regarded as the hub of the Intelligent Design movement. On their website, they provide the following answer to the frequently asked question, *Is Intelligent Design Science?*

> Intelligent design (ID) is a scientific theory that employs the methods commonly used by other historical sciences to conclude that certain features of the universe and of living things are best explained by an intelligent cause, not an undirected process such as natural selection. ID theorists argue that design can be inferred by studying the informational properties of natural objects to determine if they bear the type of information that in our experience arise from an intelligent cause. The form of information which we observe is produced by intelligent action, and thus reliably indicates design, is generally called "specified complexity" or "complex and specified information" (CSI). An object or event is complex if it is unlikely, and specified if it matches some independent pattern. (www.discovery.org/id/faqs/ accessed 27 January 2015)

Leading ID theorist Stephen Meyer elaborates further:

> The theory of intelligent design holds that there are tell-tale features of living systems and the universe – for example, the information-bearing properties of DNA, the miniature circuits and machines in cells and the fine tuning of the laws and constants of physics – that are best explained by an intelligent cause rather than an undirected material process. The theory does not challenge the idea of "evolution" defined as either change over time or common ancestry, but it does dispute Darwin's idea that the cause of biological change is wholly blind and undirected. Either life arose as the result of purely undirected material processes or a guiding intelligence played a role. Design theorists affirm the latter option and argue that living organisms look designed because they really were designed. (Meyer, 2008)

"All English state-funded schools from primary level onwards, must teach evolution and not creationism."

Intelligent Design theorists, then, are not arguing from what is *not* there, as in a "God of the gaps" scenario, but from what *is* there. They are demanding an explanation for the existence of complex, specified information which in any other context would be accepted, without question, as indicating the activity of an intelligent being. They base their approach on the growing understanding that "information" is not material but, in the case of cell biology, is something that is imposed on the biochemical structures in the form of elaborate codes. These are the arguments that have carried much weight with current and former atheist thinkers such as Thomas Nagel (2012) and Antony Flew (2007). Antony Flew, having achieved renown as "the world's most notorious atheist", eventually abandoned that position under the influence of the Intelligent Design movement. He states (2007 p90):

> In 2004 I said that the origin of life cannot be explained if you start with matter alone. My critics responded by triumphantly announcing that I had not read a particular paper in a scientific journal. …In doing so, they missed the whole point. My concern was not with this or that fact of chemistry or genetics, but with the fundamental question of what it means for something to be alive and how this relates to the body of chemical and genetic facts viewed as a whole. To think at this level is to think as a philosopher.

Intelligent Design is a positive, not a negative, creed which employs sophisticated mathematical models and applies itself to fundamental philosophical questions. It deserves to be responded to at the same level.

## The foundations of the creation/evolution debate

The debate between Creationists and Darwinian Evolutionists is often portrayed as taking place between the intelligent, scientifically informed who are committed to evidence-based science and the ignorant, obscurantist, faithful who blindly accept what their equally ill-informed leaders tell them to believe, for religious reasons, regardless of any evidence. Professor Lloyd does not perpetuate this myth, referring to Creationists as, "not ignorant or stupid" (p299) and stating specifically that, "This is not a dispute between the scientifically informed and uninformed: the opposing positions are each held by many scientifically-trained Christians" (p292). He is concerned to understand why, therefore, the debate is "interminably unresolved" (p292). A clue to this conundrum is to be found in juxtaposing four of Lloyd's statements:

> Creationists postulate a radically alternative chronology and mechanism for cosmological and biological origins. It is an account that derives from the Bible and would not otherwise have occurred to Creationists or anyone else. (p296)
>
> The possibility of miracle is integral to orthodox Christian belief, so that the possibility that biological diversity results from miraculous events cannot reasonably be excluded. (p292)
>
> For the atheist or agnostic biologist, no credible alternative to evolutionary theory is available, and any apparent deficiencies in its explanatory power must await naturalistic explanations arising from future scientific research. (p292)
>
> In a recent book Plantinga has proposed that there is superficial conflict but deep concord between science and theistic religion, but superficial concord and deep conflict between science and naturalism. (p296)

The relationship between "science", "naturalism" and the role of the Biblical text holds the key to understanding the roots of the conflict between Creationism and Theistic Evolution. Inherent to this explanation is the understanding that the word "science" carries more than one meaning – Stephen Meyer (2011, pp 96-97) has identified at least twenty – so that when Creationists are accused of being anti-science it is in fact naturalistic science, when it is applied to biological origins, that they are criticising. Creationists would be the first to agree with Plantinga that there is deep concord between science and theistic religion and they would argue that the history of science strongly supports their case (Baker 2014).

An analysis of the four statements quoted above illuminates the point further. Lloyd states that the concept of the Universe as designed and created just as in a face-value reading of Genesis Chapter 1 (together with other Biblical texts) would not have occurred to "anyone else". As Peter Hamilton (1997) has demonstrated, this was precisely the viewpoint that gave rise to modern science. It was the viewpoint of Kepler, Newton, Boyle, Linnaeus, Pasteur, Mendel, Faraday and Clerk Maxwell, to name but a few. It was exactly because it would not occur to anyone else that modern science was only able to take off once the Bible came to be viewed in a more literal way at the time of the Reformation. In subsequent centuries, those who continued to take this Reformation view were often those who provided key breakthrough concepts which enabled modern science to proceed.

It is the Creationist contention that modern science has been "hi-jacked" by naturalism whereas its most successful context has been Biblical literalism. This is especially true when it comes to another Biblical concept, the concept of the "Fall". Again, Peter Harrison (2007) has made a major contribution in identifying the importance of the concept of the Fall in the emergence of modern science. It was when the world was viewed as created but fallen and damaged and when humankind was viewed as created in the image of God but also as fallen and damaged that modern science was able to emerge and proceed.

"In the place of a God who is wholly and completely good … we now have a god who creates by a process involving death."

## The source of the exasperation

The source of the exasperation felt by Creationists towards Theistic Evolutionism stems from what they perceive as the inconsistency of that position. Creationists would maintain that Theistic Evolutionists appear to be in thrall to *naturalistic* science. As the third quote above rightly indicates, atheists and agnostics have no option; their science *has* to be naturalistic, not on the grounds of any evidence but *a priori*. Theists have no such obligation or necessity. Whereas much observational science can happily proceed in both contexts, this is not true of the science of origins. Here the context is everything. The study of origins falls in the category of "historical science"; its methods are more akin to historical research and forensic science than to the science of repeatable laboratory experimentation. In these circumstances, in which it is not possible to proceed by direct observation, the fundamental presuppositions of the researcher carry much more weight in how the evidence is interpreted. Creationists therefore cannot understand why any Christian who has a high view of the authority of the Bible and who believes in miracles should wish to adopt a naturalistic context for such an important topic. In doing so, they switch their world-view in order to embrace the Darwinian paradigm and their position becomes inconsistent.

## The theological consequences

Adopting a naturalistic position, coupled with an uncritical approach to assessing the nature and validity of Darwinian evolution, has profound theological consequences for a Bible-believing Christian. The very nature of God and of the Gospel has to be viewed differently; this is not a minor issue. In the place of a God who is wholly and completely good and whose created order originally reflected that goodness, we now have a god who creates by a process involving death, mutated horrors and general destruction. In the place of judgement against evil, as exemplified by the Flood, we now have catastrophe becoming a creative process. In the place of death as a consequence of sin, we now have death as a creative process. In the place of the clear story of salvation by the coming of the second Adam, we now have confusion because we have no idea who or what the first Adam was. In the place of a short history of death and suffering which will soon cease when all will be restored, we

Teacher with primary school children in biology lesson.
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have hundreds of thousands of years of human suffering, preceded by millions of years of animal suffering, during which God was apparently quite happy with it all because it was how He likes to operate.

I do not for one minute believe that all (if any) Theistic Evolutionists really think like this, but herein lies the inconsistency. This *is* Darwinian evolution and it is impossible to see how it can be reconciled with Denis Alexander's view, quoted on p296 of Professor Lloyd's article, of "the whole process of evolution as an out-working of God's creative handiwork fulfilling his intentions and purposes for the created order". It is easy, however, to see how neatly it fits with the views of Richard Dawkins and the British Humanist Association.

A few minutes on-line is all that it takes to establish how successful the promotion of Darwinian evolution has been in turning younger generations away from the Bible and from belief in God. A recent outburst from the atheist celebrity Stephen Fry illustrates the point exactly. An interview given by Fry in February 2015 was posted on YouTube and viewed by millions of people. During it, citing the example of bone cancer in children as his reason for hating God, Fry said, "The God who created this Universe, if it was created by God, is quite clearly an utter maniac – totally selfish, capricious, mean-minded and stupid. It is perfectly apparent that he is monstrous – utterly monstrous." One of the many internet comments written in response to Stephen Fry appeared a few days later on the Christian website www.premier.org as follows:

> I thought I would see what Christians said in response about bone cancer. There is no connection between bone cancer, which has been a feature of the world for millions of years and free will which is only 100,000 years old. It seems free will did not cause bone cancer. Christians – why did God make bone cancer in children? If there is no answer, then Fry's rant is 100% justified.

Theistic evolution has no solution to this problem. Neo-Darwinism is categorically based on chance mutations and the elimination by natural selection of the defective or inadequate organisms which result from that process. To date, theistic evolutionists have not attempted to provide a alternative version of evolution theory which would be in accord with the goodness of God nor do they attempt to provide direct answers to the kind of issue that Stephen Fry has raised.

## Conclusion

In order to understand the roots of the conflicts between Theistic Evolution, Intelligent Design and Young-earth Creationism it is necessary, in the words of Antony Flew, to "think like a philosopher", particularly with reference to the philosophy of science. It is also necessary to "think like a historian", particularly with reference to the history of science. Perhaps most importantly, it is also necessary to think like a theologian. Profound and fundamental issues are at stake, including the nature of God, the efficacy of the Gospel and the reliability of the Bible. Intelligent Design theorists are crying out for their position to be better-understood by the Christian community. Young-earth Creationists are asking that they should be treated with more respect, if only because theirs is the position which has been most fruitful in the history of modern science. Professor Lloyd's paper goes some way towards meeting those needs but he underplays the theological difficulties inherent in an acceptance of Theistic Evolution.

It is often said that, "An Almighty God can do what He likes. If He chooses to create by a process of evolution, He is quite capable of doing so." It is the contention of Young-earth Creationists that it would be impossible for the God of the Bible to create by a process of Darwinian evolution. It is not possible, they would say, for God to lie (Numbers 23:19), or to be unfaithful (2 Timothy 2:13), or to be tempted by evil (James 1:13-16). In short, God cannot act contrary to His character. A good God cannot create by an evil process. That being the case, Theistic Evolutionists who wish to abide by the teachings of the Bible must come forward with an alternative to Darwinian evolution that does not involve death and suffering. ■

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# Gender and Sex

## The evolutionists' dilemma

J H John Peet

This is a topic rarely touched on by creationists, but that's a pity as it is an area in which even the evolutionists admit their inability to explain adequately the origin of gender and sex. I know of two creationist presentations, one by Dr Geoff Barnard (unpublished) and another by Dr Randy Guliuzza available as a DVD (Guliuzza, 2013). I acknowledge my indebtedness to them for pointing me in this fascinating direction.

The subject is fundamental to any consideration of the survival of a species, let alone a "kind". It is also a means to variety in both animals and humans (so that we are not clones of each other) by a mixing of male and female genes. But how did it all arise?

In the creation account, it is repeatedly emphasized that God originally provided the capacity for reproduction. The animals were commanded by God to "increase in number" (Genesis 1:22). Each kind was equipped and enabled to reproduce itself in its own way.

It was God's idea to create man and woman differently and apart from the animals: "So God created man … male and female He created them" (Genesis 1:27, emphasis added). So, man[kind] consisted of male + female. They are counterparts of a kind and incomplete without each other. Mankind was also commanded to "be fruitful and increase in number" (Genesis 1:28).

What about an evolutionary explanation? Here are some admissions. "Without sexual differentiation, the line of descent would have been much slower and probably would not have reached the present high level, so that man would not have developed." (Rensch, 1960) "Sex is the queen of problems in evolutionary biology. Perhaps no other natural phenomenon has aroused so much interest; certainly none has sown so much confusion." (Bell 1982) Also, "Despite some ingenious suggestions by orthodox Darwinians, there is no convincing Darwinian history for the emergence of sexual reproduction." (Kitcher, 1998)

> "As we look at the processes involved, at each step remember to ask how these could have originated."

So, how *do* they explain the origin of gender and sex? According to a study of **strawberry plants** (Spigler and Lewers, 2008), in an article in *Heredity,* we all descended from hermaphrodites (an organism that has reproductive organs normally associated with both male and female sexes). In the study, two genes located in different spots on a chromosome determine whether a strawberry plant will be a certain sex, hermaphroditic, or neuter. One gene codes for female organs, the other for male; each can be "on" or "off," thus leading to four possibilities: hermaphroditic (both "on"), male, female, or neuter (both "off"). But this does not explain how the sexual organs themselves originated! Nor does it explain the origin of the genetics controlling this process.

Kim Lewers of the United States Department of Agriculture says, "Until now, no example had been found of the very earliest steps. Therefore, those steps were undemonstrated to be true." While the conclusion focuses on plants, the researchers ***believe*** the same explanation likely extends to animals and humans.

So, let's look more closely at the processes that occur in humans. Obviously there are parallel considerations in the animal kingdom, but our primary interest in this article is ourselves. As we look at the processes involved, at each step remember to ask how these could have originated. I am sure that you will agree that they all speak of a plan rather than chance.

Firstly, in order to have sex and so reproduction, the first man, Adam, like all later men, had to find his partner, Eve. Did they evolve in the same area at the same time? If they did not, then there was no advantage to favour their survival.

It is also true that they did not just need appropriate sexual organs, but they had to match those of their partners (more on this later!) Not only did the organs have to be compatible but the physical structures and their arrangement had to

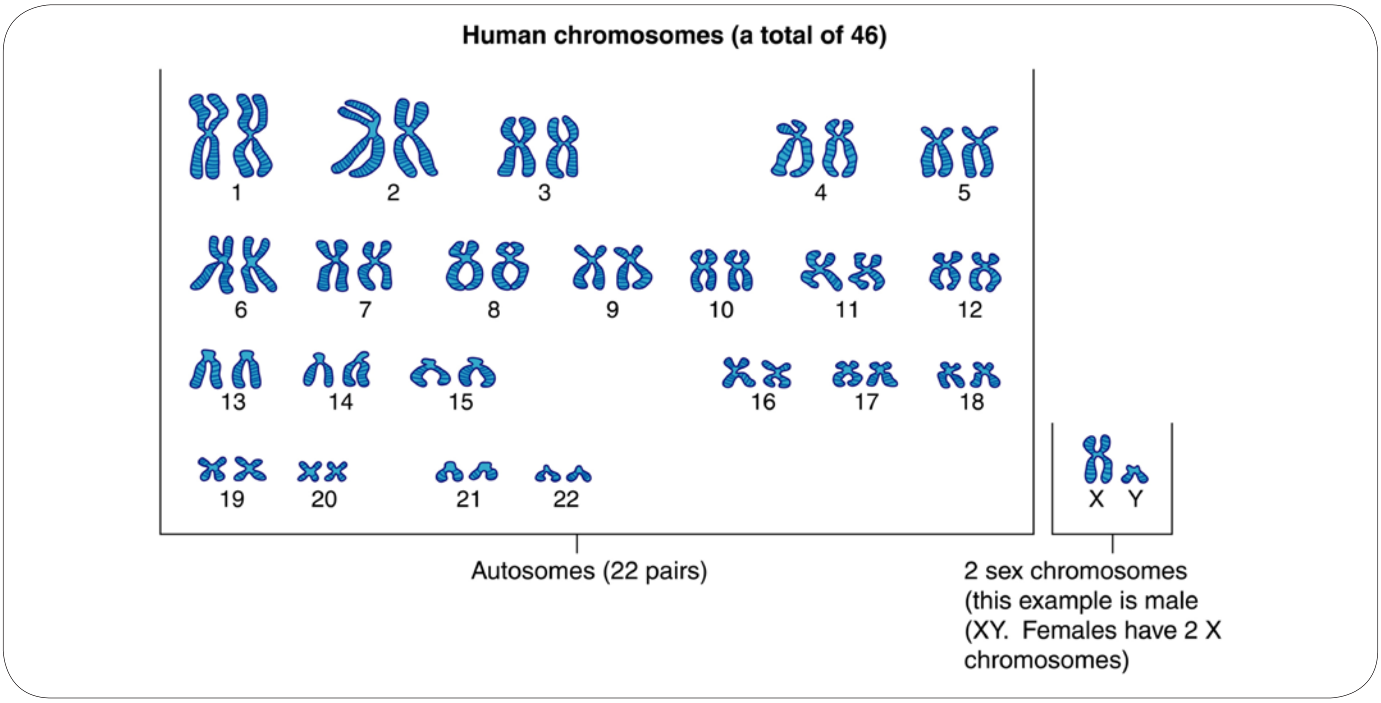
Human chromosomes (a total of 46)
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
X
Y
Autosomes (22 pairs)
2 sex chromosomes (this example is male (XY. Females have 2 X chromosomes)

**Fig 1.** Illustration of human chromosome complement ID 13135966. © www.dreamstime.com

be compatible – from the first. How did that occur?

We have to dig even deeper: what about the underlying genetics? The cell has many parts – and that's another story in itself (see for example Rana, 2008)! Our interest at this point is in the nucleus and in which we have our chromosomes. There are 23 pairs of these in the human being and they carry in their structure the genes that enable the body processes to function and make each of us distinctive. 22 of these (numbered 1-22 in Fig 1) are the same in the men and women, but the other pair differ.

These are known as the "sex chromosomes" as they determine the distinct sexual characteristics. Women have two X chromosomes; men have one X and one Y. It is the Y chromosome that makes males men and so differentiates the two sexes by its presence.

The key part of the Y chromosome (See Figure 1) for determining the sex of the embryo is the *SRY* gene *(Sex-determining region Y)* The *SRY* gene triggers a cascade of events that result in the embryo developing testes and this, in turn, leads to a dramatic increase in **testosterone** levels which build up body muscles of the male. We will comment on the hormones further in due course.

A full study of reproduction would need a detailed investigation of every aspect of the process, but that would require a much longer article! I have opted to consider only the male sperm to illustrate the complexity of this process. We will (like the sperm!) meet the egg and some of its aspects but there is much more to be considered for that, as we shall see.

The sperm starts off as one of the smallest cells in the body. Figure 2 shows two key aspects that we will refer to. At one side of the nucleus is a structure known as the acrosomal cap. This will become the head of the sperm. It contains the enzymes needed for the sperm to penetrate the egg. The centrioles (in the surrounding cytoplasm) are going to form the tail of the sperm.

The cell is very delicate and is protected and fed by a group of "nursing cells" known as Sertoli cells. They will be responsible for removing the cytoplasm in the maturing sperm. Also present in the cytoplasm, as in any cell, are the mitochondria. These are the structures that generate the energy required for the chemical and mechanical processes needed in the cell. They will gather in the mid-piece of the sperm to drive the tail

The sperm is now ready for its incredible journey! But there are hazards ahead. To reach the egg, it has to travel through the vagina, the entrance to the uterus, through the uterus to the fallopian tubes. Easy? Not so. There are real barriers to survival on this trip. Firstly, the vagina is

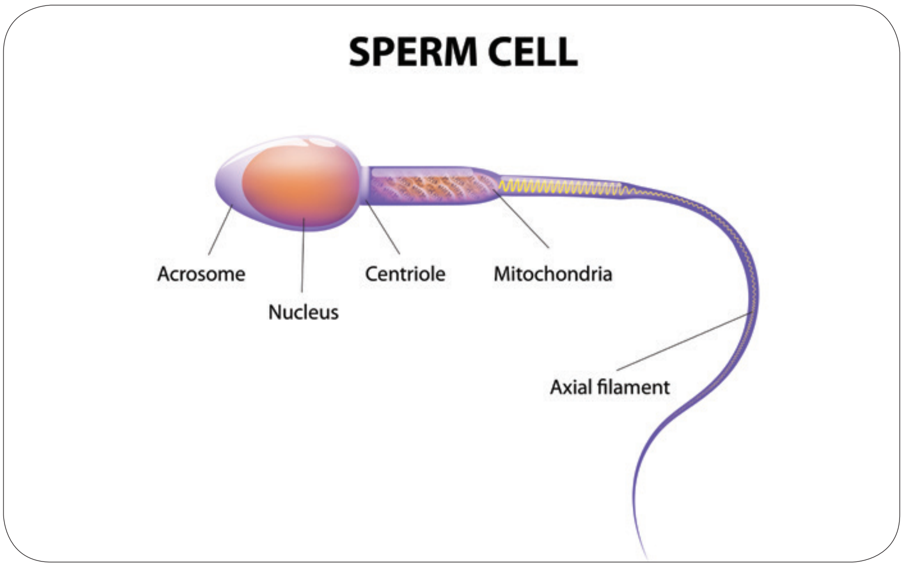

**Fig 2.** A single sperm. © C. Selvanegra, www.istockphoto.com

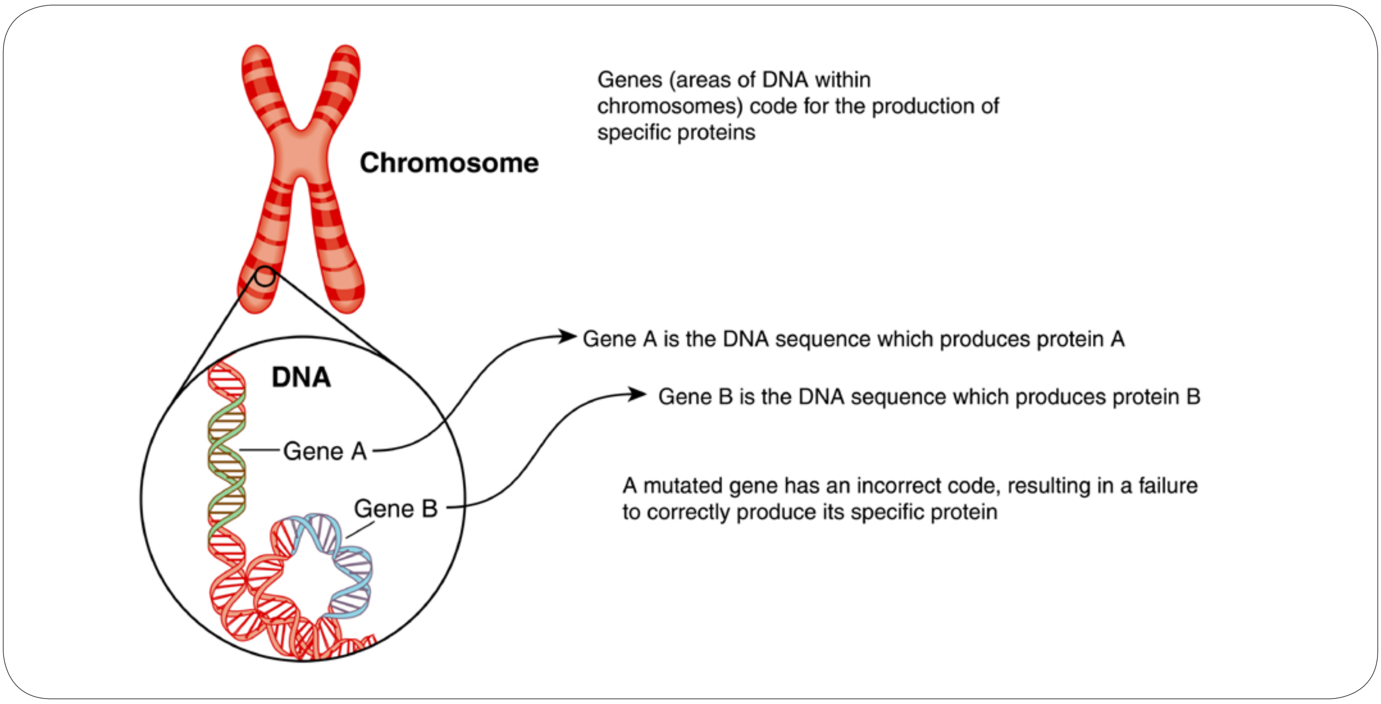
Chromosome
Genes (areas of DNA within chromosomes) code for the production of specific proteins
DNA
Gene A
Gene B
Gene A is the DNA sequence which produces protein A
Gene B is the DNA sequence which produces protein B
A mutated gene has an incorrect code, resulting in a failure to correctly produce its specific protein

**Fig 3.** Diagram of chromosome, genes and DNA. ID. 13135968. © www.dreamstime.com

acidic and that will kill the sperm. But, the sperm is carried by a liquid, the seminal fluid, which neutralises the acid and allows the sperm to move on.

Then there is a mucus plug which prevents our little explorer getting into the uterus. The seminal fluid comes to the rescue again by diluting the mucus and so it can continue on its journey. However, the uterus is lined with cilia which brush against the sperm preventing them moving up to the fallopian tubes. Or they would be so prevented but for the seminal fluid again, which causes the cilia action to reverse and push the sperm forward! Surely that must be the final hurdle? Not so. The sperm is a "foreign body" and so the immune system will destroy it. But again, the Great Designer has taken that into account and the local immune system is suppressed so that the sperm can travel on to meet the egg. The seminal fluid also has antibacterial properties.

Remember the challenge I gave earlier: "at each step remember to ask how these could have originated"? There is the need for the complete formation and design of the sperm and now we see that the seminal fluid properties also had to be in place. So, let's move on to the mating of sperm and egg!

When a male and female mate, the male sperm and female egg are "fused" to make the zygote. (The term "zygote" means "yoked together" in Greek.) Many million sperm are released but only one succeeds in fertilising the egg. This is because the egg is surrounded by a protective layer, *zona pellucida.* The acrosome, which we mentioned as part of the head of the sperm, stores powerful enzymes which are needed to penetrate the *zona pellucida.* Once one sperm has penetrated this layer, the layer becomes impenetrable to any other sperm. This layer is described as *species specific* and is said to prevent cross-fertilisation between animals of different species. In fact, the term is misused; the *zona pellucida* prevents cross-fertilisation of animals of *different families* or "kinds". Some creationists use this as the means of identifying species of the same family (kind), which *can* interbreed, of course.

Once the sperm has entered the egg, the chromosomes are mixed and cell division begins. The first stage is the pairing of identical chromosomes (Figure 3). They have to line up exactly; it cannot be random. Cross linking occurs to enable variation (Figure 4), but within limits. Cell division occurs immediately in order to build up the embryo towards a human baby.

The events of the next few days are staggering in their detail. The cell that makes up the fertilised egg copies itself and then is differentiated into hundreds of different types, those that are needed to produce the embryo and ultimately the foetus. The detail is very complex but fascinating. To cover this would need another article. For those who are interested in the account of this development I would recommend a book by Jamie A Davies (2014). It is written from an evolutionary perspective but there is a significant comment by him: "Whether or not one believes such evolutionary just-so storied, the fact is …" (page 77). If you read this book, ask yourself continually: how did this originate through numerous small steps? How did the embryo "know" how to do this?

Some significant stages occur in the first few weeks. At 3 weeks, the heart is formed with its own blood system and the spinal column and nervous system begin to form. By 6-7 weeks, most organs are in place. Then at 8 weeks, if the Y chromosome is present, the SRY gene "kicks in" and sexual differentiation occurs. But, all along and at every stage, the embryo is distinctly human (Figure 5).

The psalmist got it right:

> "You created my inmost being;
> You knit me together in my
> mother's womb.
> I praise You because I am awesomely
> and wonderfully made.
> Wonderful are Your works."
> Psalm 139:13-14

### A word about hormones

Let's go behind the scenes and see the role of the hormones in this process. Again,

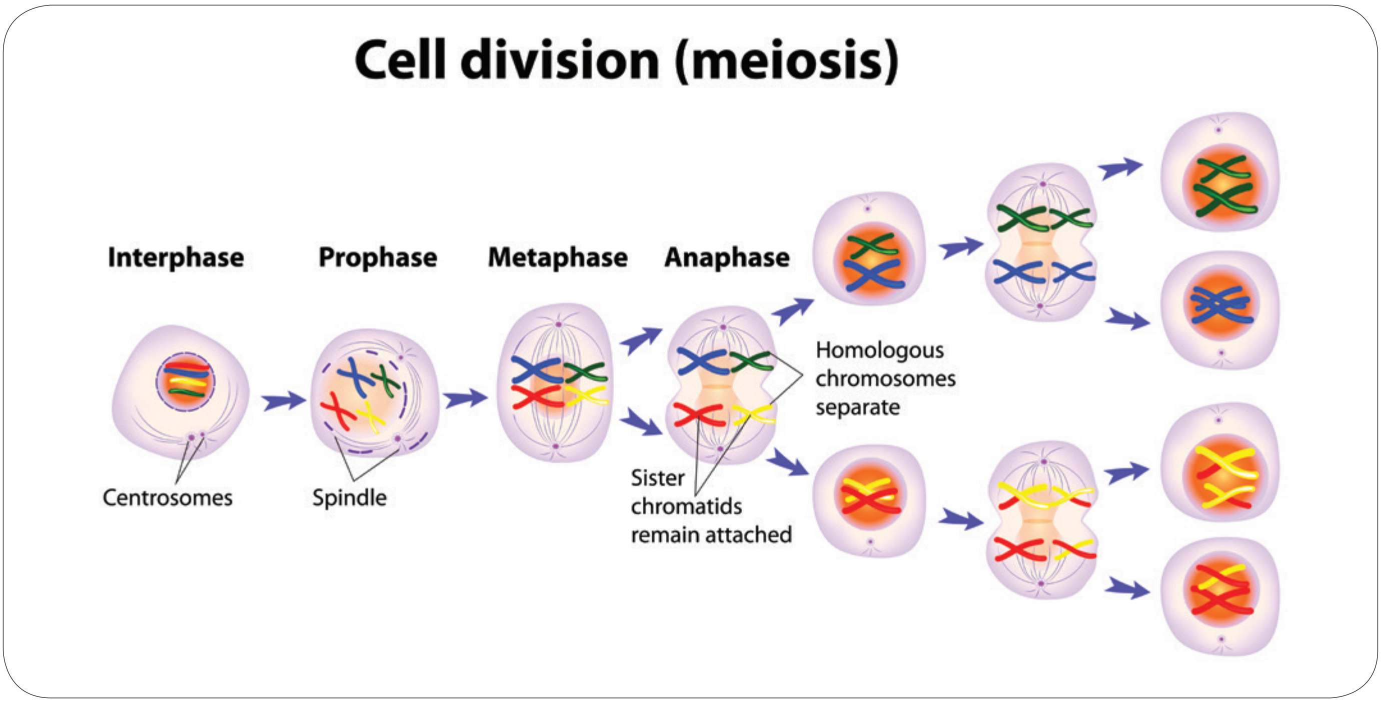

**Fig 4.** Phases of meiosis (note exchange of DNA between yellow and red chromosomes. ID 27308335. © www.dreamstime.com

we cannot cover every one of them, but we will look at some of the key ones. The name *hormone* comes from the Greek (ορμυαω) for "I excite" which gives the key to their function. They are the chemical regulators for body processes. Without them the processes won't occur.

One of the discoverers of hormones studied how nervous and chemical signals regulated the body and used the phrase "wisdom in the inward parts". This is based on the words of God to Job in Job 38:36 ("Who has put wisdom in the inward parts? Or who has given understanding to the heart?")

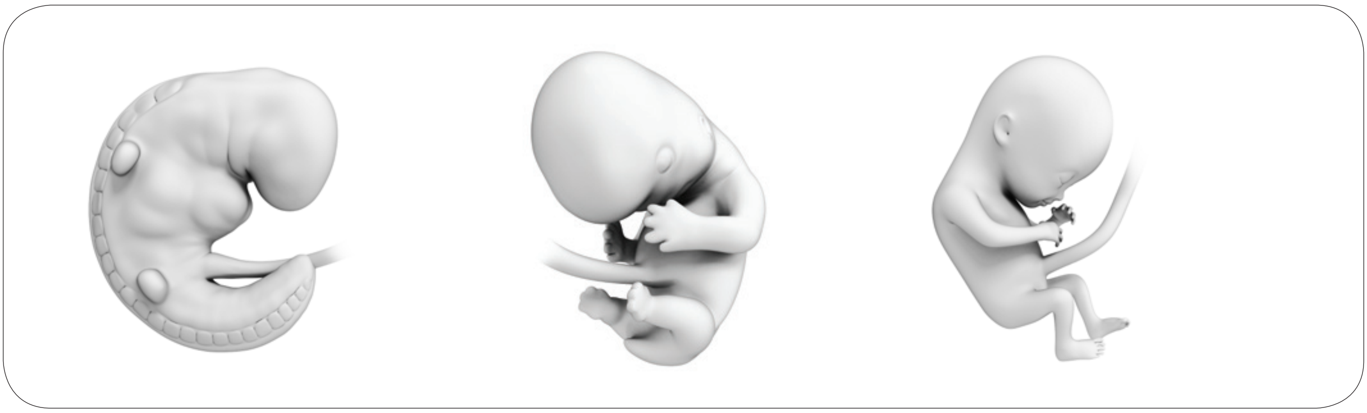

**Fig 5.** The development of the human embryo at 1,2 and 4 months (not to scale). © Eraxion, www.istock.com

Hormones are secreted from about 15 specialized glands, *e.g.* insulin in the pancreas to control sugar levels. They are important to the correct functioning of the body. They pass into the blood stream which delivers them to their target. In other words, the parts would have no function/advantage unless the hormones came first. But why would the hormones arise if they had no purpose? The hormone is secreted at one site, enters the blood stream and is delivered to its target.

We have already mentioned the role of **testosterone** in the male. Its production is stimulated by the hypothalamus which instructs the pituitary gland to send hormones to the testes to generate the testosterone. But, there must be a feedback system otherwise the levels of testosterone would reach dangerous levels. When amount of testosterone reaches a critical level, it circulates back to the hypothalamus which signals a stop in its generation. How did all these parts and factors originate "on time"? As one writer expresses it, "The body's systems tend to be wisely over-engineered" (www.creation.com/life-is-in-the-blood).

**Oestrogens** are female hormones and are important in enabling their particular gender functions, *e.g.* developing the breasts at puberty and preparing the body for possible pregnancy. They are produced in the ovaries and, during pregnancy, in the placenta. Again, this occurs under the control of the hypothalamus and pituitary gland and with a feedback system.

Other female hormones are important in this process of reproduction. When the baby is fully developed and is ready to face the world, **oxytocin** is activated by the pituitary to stimulate the mother's womb to give birth. Then, to produce milk, **prolactin** needs to come into play. Each has a role to play – and at the right time!

Even the atheist Richard Dawkins

(1997) says: "To say, as I have, that good genes can benefit from the existence of sex whereas bad genes can benefit from its absence, is not the same thing as explaining why sex is there at all. There are many theories of why sex exists, and none of them is knock-down convincing … . Maybe one day I'll summon up the courage to tackle it in full and write a whole book on the origin of sex.") We are waiting, Prof. Dawkins!

Another writer comments, "How sex began and why it thrived remain a mystery." (Wuethrich, 1998).

### A biblical perspective

Gender and sex are not the result of improbable chance processes, but the results of Divine design. Humans were created special and different and so our gender and sex relationships are unique and reflect our Maker. In particular, sex in humans is the outcome of a **love** relationship. In that, it is unique in the created world. The evolutionary view robs sex of meaning. This is one of the great problems in our British education system which wants to give "sex education" to increasingly younger children and yet it is devoid of the biblical meaning. It is often described as "recreational" and to be enjoyed (without biblical constraints) like any other recreational activity. Then we wonder why we are in such a mess in our relationships!

R Kent Hughes (2004), in his commentary makes an important point: "God defined humanity, sex and love – and elevated them all. … Love without God has reduced love to an inner feeling. When love becomes a feeling, anything goes. … But how lovely it all is with God at the centre and His primeval instruction the rule and guide." Amen.

But reality is different from God's ideal. Man rebelled and went his own way; this is called "the Fall". Everything became spoilt and the first two spoilt things were man's relationship with God and with his wife (Genesis 2:24-25; 3:7-8), but it also affected other aspects of life.

We have seen some of the wonders of human sexual relationships, but sin has affected these as well. One obvious one is the replacement of love in many by lust and selfishness and this is demonstrated in the Genesis account. The beauty of gender differences and sex have been spoilt. Read any day's papers!

One of the results of man's rebellion was the introduction of mutations which damage the genes, for example. So we get physical deformities which can affect our sexual aspects too, for example, impotence. Another effect is with stress which in turn can cause physical, emotional and other problems.

### Are men really heading for extinction?

This question has prompted one posed to the writer: "Is it true that the Y chromosome of men is degenerating to such an extent that they will eventually become extinct or, at least, unnecessary?" The question resulted from claims by some researchers reported in the press. So, what is this about?

Various researchers (Sykes, 2003) have claimed that the gene is degenerating due to accumulating mutations and so will become ineffective. They compared the X and Y chromosomes. In the former, there are 1376 genes present, but only 284 on the Y chromosome (other references quote various figures such as around 2,000 and 78 genes respectively!). The other genes, they claim, have been destroyed over a long period of time in our evolution from an ape-like ancestor. Indeed, Bryan Sykes described it as a "graveyard of rotting genes".

The problem is supposedly accentuated as men produce sperm throughout their lives and so the older the man, the more the mutations that affect his sperm. Other workers have more recently claimed that, in mice, the gene pool on the Y chromosome can be reduced to two specific genes and still produce males! However, the process is only possible by artificial insemination and not by natural reproduction. Other scientists are cautious on how far this can be applied to humans.

The sceptics reckon we have lost many of these genes on the Y chromosome over the last 100 million years and so have only 100,000 to 5,000,000 years left. Others have pointed out that even on this time scale, the Y chromosome has been virtually unchanged for the last 6 million years (Hughes *et al* 2005), so our survival would be very much longer. More recently, two groups of researchers (Bellott *et al.,* 2014; Cortez *et al.,* 2014) have confirmed that the genetic content of the Y chromosome is stable and "not a single gene has been lost … in the past 44 million years". A reading of a summary article in the popular journal, *New Scientist* (Holmes, 2014) makes it clear that these ages and the reasoning are based on evolutionary assumptions, but the principle confirms what we would expect from a biblical standpoint, namely that males will not become extinct.

The presumed problem relates to the fact that all other chromosomes exist as pairs, so, if a mutation occurs on one of the pair, then the unaffected one can compensate. The Y chromosome does not have that protection as it is singular in this respect.

However, this is where we see a sign of the good hand of the Creator. The Y chromosome has no problem on this front as it has a unique checking and repairing mechanism. The Y chromosome has a mirror image of its gene distribution (See Rozen, 2003), the top sequence being repeated in the bottom end (often described as a palindrome). So, it folds up on itself to pursue this backup process!

For those who see the origin of humans as a result of special creation as recorded in Genesis 1-2, the presence of such design aspects is no surprise. Jennifer Hughes says that human and chimpanzee Y chromosomes differ "radically in sequence and gene content" (Hughes *et al.,* 2010), which seems to make a poor case for a common ancestry.

Those who hold to the argument of the *degeneration* of the Y chromosome and its inevitable consequences actually resort to an approach to evolution that is in conflict with the usual claim that "natural selection" favours *improvement* over time. Others would point out that the evidence accumulated, for example in the Human Gene Mutation Database, favours the argument that mutations are mostly, if not entirely, degenerative.

However, don't worry ladies, your men will be around until the Lord returns – that's His promise (Luke 17:34)!

### What about the Y-chromosome "Adam"?

The fact that all human males have very similar Y chromosomes has led to the conclusion that there was a single male ancestor for the entire world population. He has been nicknamed as the "Y chromosome Adam". Of course, the Bible believer would not be surprised at that as we are all descended from Adam and, later, from Noah, his sons and their wives! However, this chromosomal Adam is dated as having lived somewhere around one to two hundred thousand years ago.

There are differences in the chromosomes between the people groups and these are due to the mutations (changes) that occur and accumulate over time. The principle used is that, if we count the extent of the variation, we can estimate the time when the two groups separated and went their own way. The problem is, of course, to know how long it takes for mutations to arise and become "locked in".

The issue is to know how fast these events did occur. An assumption is that if, for example, we measure the rate of such changes in the present day, then that has always been the rate. But Conrad *et al.* (2011) have shown that such assumptions are not valid.

It had been estimated on evolutionary principles that changes in the mitochondrial gene (inherited from the maternal line) would occur at the rate of one in every 300-600 generations, hence the date given for the mitochondrial Eve. But research in 1991 on the family of the former Tsar of Russia showed it occurred more frequently than they expected: 1 mutation in every 800 years, that is, one in every 400 generations (Parsons *et al.,* 1997). That reduced the time of Eve to around 6,000 years!

## Some biblical issues arising

There are two unusual examples in the Scripture which concern the role of the Y chromosome, each of which I have had raised in some question time. The first concerns the **origin of Eve**. The biblical account is plain. She was created by the direct and specific action of God Himself. "Male and female He created them" (Genesis 1:27) and, more specifically, "The rib that the LORD God had taken from the man He made into a woman" (Genesis 2:22).

At first glance that sounds like a cloning of Adam, but it clearly was not. If Eve had been a clone, she would be a man with Adam's Y chromosome. But she was a true, a perfect woman. That this was an exceptional act is clear from the apostle's comment, "For man was not made from woman, but woman from man" (1 Corinthians 11:8). The cells from Adam's bone would have contained X and Y chromosomes, but Eve clearly didn't inherit the Y chromosome. The Bible does not tell us the detail, but God clearly only transferred the X chromosome to Eve.

Then we have the miraculous **conception of our Lord and Saviour**. Mary, being a woman, had only X chromosomes, but our Lord was a perfect man and would have had a Y chromosome. Again, it is clear that God controlled this and created a Y chromosome in the fertilised egg. As the Scriptures say, "The Holy Spirit will come upon you [Mary] and the power of the Most High will overshadow you, therefore the child to be born will be called holy – the Son of God" (Luke 1:35).

For those who accept the Bible account of the creation of man and woman, we recognise that the creation of humans was a miracle, along with the rest of creation, so these two miracles (origin of Eve and conception of our Lord) do not raise any difficulty. We have no difficulty in believing that the Lord God did these things too.

## Concluding thought

We go back to that verse from the Psalms that we quoted earlier but I emphasise some important words:

> "You created my inmost being;
> You knit me together in my mother's
> womb. I praise You because I am
> awesomely and wonderfully made.
> Wonderful are Your works."
> **(Psalm 139:13-14).**

That is our testimony. ■

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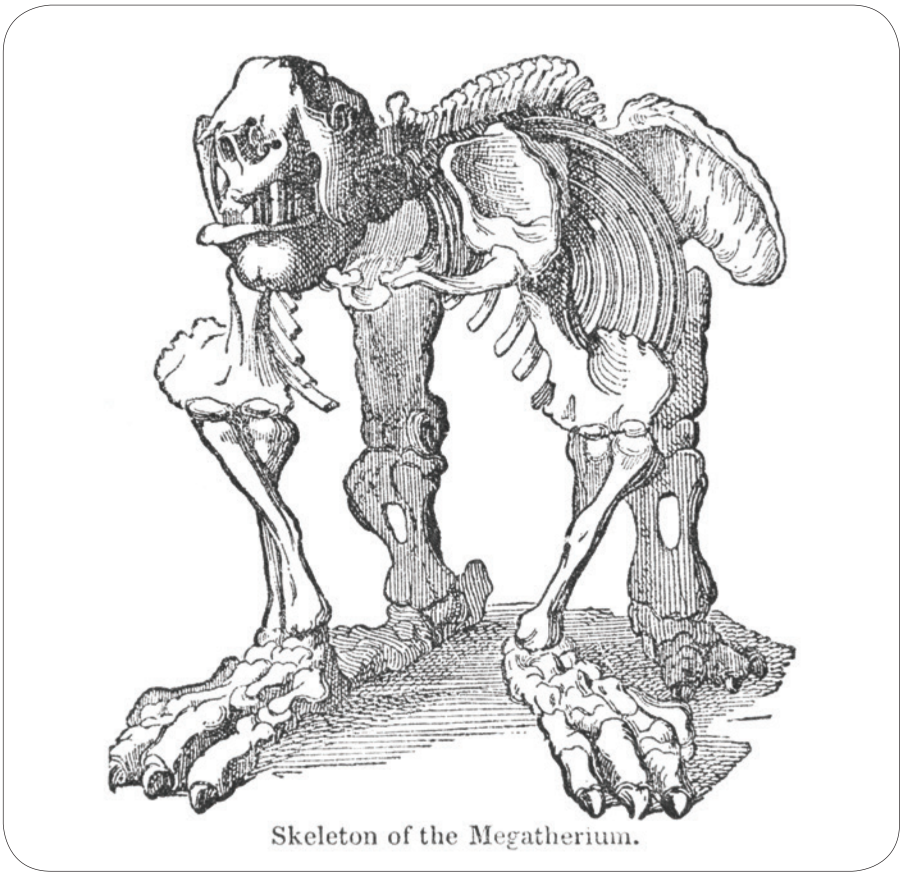
# Archaeology and the Paradigm Shift from Antiquity to Deep Time

James Powell

"Half a century ago, man's past was supposed to include less than six thousand years; now the story is seen to stretch back hundreds of thousands of years." So wrote the early 20th century historian James Robinson about a perceived 'paradigm shift' in universal history and archaeology. A 'paradigm' is an explanatory framework that makes sense of a given set of observations, and that is founded upon certain basic assumptions. This article has three main objectives:

- To describe the paradigm behind early-phase archaeology
- To explain the 19th-20th century shift in western historical tradition
- To critically evaluate the dominant 21st century paradigm

> "Geologically, the paradigm of early historians and archaeologists included a universal cataclysm."


Skeleton of the Megatherium.

Skeleton of Megatherium, an extinct, giant member of the sloth family. Victorian engraving from a book published by William S Orr and Co. © simonbradfield, www.istockphoto.com

## The Dawn of European Archaeology

Archaeology has been a popular pastime among art collectors for many thousands of years, but it was not until the 16th and 17th centuries that a standard scientific methodology was developed in Europe. The archaeologist of today is a historian who is not limited to the written word but goes further and carefully digs out evidence of the remains and relics of ancient peoples to prepare them for scientific publication.

The early 16th century saw a resurgence of interest arise in ancient artefacts and manuscripts as part of the wider European Renaissance and Reformation. The Vatican began collecting artefacts in AD 1505, whilst antiquaries such as John Leland and William Camden began surveying megalithic monuments for publication. Historians of the age based their conclusions regarding the human past upon a significant corpus of over one thousand texts written by approximately eighty authors from classical and ancient times. These included authorities such as Pliny and Isidore of Seville. Others were geographers, for example Pomponius Mela and Ptolemy, whose knowledge of ancient place names could be used to discover the founding ancestors of cities.

Still others were focused upon recounting historical events to as far remote (in some cases) as 2100 BC. These included early historians such as Livy, Plutarch, Dionysius of Halicarnassus, Berosus, Diodorus Siculus, Sanchoniathon, Appian, Herodotus, Sallust, Josephus, Eusebius, Valerius Maximus and Rufus. All these well respected authorities took centre-stage within a long-established academic tradition, together with one special source – the Judeo-Christian *Tanakh* (Old Testament) – widely regarded as sacred. (Smail, 2008 and Stringer, 2006).

Geologically, the paradigm of early historians and archaeologists included a universal cataclysm which had destroyed almost all traces of world civilization at some point in the mid-third millennium B.C. Historically, since then, there had been five distinct ages within recorded memory. The Greek scholar Hesiod classified these 'ages' under the headings: golden (~2600 – 1680 B.C.), silver (~1680 – 1350 B.C.), bronze (~1350 – 1130 B.C.), heroic (~1130 – 810 B.C.) and iron (~810 B.C. onwards). Sociologically and biogeographically, the paradigm incorporated a West-Asian radiation model of just one patristic people group from the hills of south-eastern Turkey. This diffusionist model presented the rapid stratification of surviving humanity by cultural elites (chosen monarchs) distinguished via their birthrights and territorial inheritance from the earliest period of their burgeoning civilizations. These elites acted as the privileged repositories, guardians and purveyors of knowledge, skills, resources and social justice.

The validity of such manuscripts formed the basic assumption of the earliest paradigm and although primarily a monastic European phenomenon, it was by no means *exclusively so*. The written past held real authority across international boundaries. Yet between the years 1500-1700 (a period Grafton (2012) calls the *Ars Historica)* overly critical methods of analysis severely undermined their authority.

## Background to the Shift

The first rumblings of discontent with the early-phase paradigm can be traced back to the early 16th century in the writings of Leonardo da Vinci (1452-1519) and Girolamo Fracastoro (1483-1553). Within his notebooks of 1508-1518, Leonardo abandoned many authoritative accounts of a cataclysmic flood when instead he jotted regarding seashells found at high altitude: "Since *things* are far more ancient than *letters,* it is not to be wondered at if in our days there exists no record of how the aforesaid seas extended over so many countries" [emphasis mine]. The adequacy of past written records was again radically challenged at a chronological level with the publication of a text called *New Work of Correcting Chronology* by Joseph Scaliger in 1583. His terse criticism seriously undermined former universal histories: "See what happens when authority is preferred to truth; everyone who reads this thinks it must be true, since it comes from Eusebius" he fumed. A controversial antiquarian named Giovanni Nanni suffered even greater castigation from Scaliger's quill; yet in reality Scaliger was just one 'cog' within a larger continental 'machine' of humanists discontented with Moses (c.f. Powell, 2012). Throughout the next three centuries many fields underwent a paradigm shift just as radical as in chronology. In geo-theory for instance, building upon the pioneering work of Nicolaus Steno, later catastrophist theorists such as George Cuvier and William Buckland began to dissociate earth history from human history by advocating multiple *localised* catastrophes followed by successive acts of creation. Human beings, it was argued, were *only present during the last* of these diluvian upheavals – whereas the fossilised remains of various extinct mammals found unassociated with any tools indicated *they* must be from an 'antediluvian age' significantly *older* than humans. Unwittingly, these catastrophists had introduced a 'fudge factor' which archaeology would soon explode.

The biblical 'West-Asian radiation' model of human universal history only faced direct criticism, however, when the paradigm crisis in geo-theory had matured. An early sign of disquiet occurred in the year 1655, when Sir William Dugdale in his *History of Warwickshire* reiterated Michele Mercati's argument that shaped flints were "weapons used…before the art of making arms of brass or iron was known". This simplistic association of time period with 'cognitive sophistication' introduced the radical and enduring notion of a *stone age*. This novelty completely up-ended the *golden age* of humanity recounted by Hesiod and others, which presumed cognitive stasis (even degeneration) in human intellect over time. Within a century, even the greatest authorities were downtrodden in the name of 'progress'. Jean Astruc's 1753 treatise on the first book of the Torah (*B'resheet*) marked the beginning of higher critical methodology as applied to the Judeo-Christian *Tanakh*. The crisis had finally reached hallowed ground and the special place afforded to humankind was fast evaporating.

## The Tipping Point in Europe

Serious signs that the crisis was boiling over began in the year 1797 with an unorthodox study of the stone 'hand-axe' cache of Hoxne in Suffolk by John Frere. He went so far as to suggest that the cache might be significantly older than six thousand years. Similar thoughts were soon entertained by the Danish historian Vedel-Simonsen. In 1813 he claimed that Scandinavian civilization could be divided *successively* into an age of stone and wood, then an age of copper and finally an age of iron. By 1820 this 'prehistoric' scheme was already being used to arrange museum collections in Europe and by 1825 a Catholic priest named John MacEnery was empirically challenging Buckland's dogged insistence that extinct mammal remains were never to be found associated with human tools. Maintaining a recent West-Asian radiation model began to look increasingly fraught with *ad hoc* explanations. Buckland's 'fudge factor' had failed.

This crisis reached a critical point in the year 1859. Further interpretations of axes from the river gravels of the Somme, near Abbeville in France, had allowed British luminaries to correlate these axes with faunal content and geological strata. Striking whilst the iron was hot, Joseph Prestwich presented a paper to the Royal Society and John Evans introduced 'deep history' to the Society of Antiquaries (Renfrew, 1976 pg. 23). Their argument for the great antiquity of humans was accepted almost immediately by the British establishment. This had profound ramifications for all subsequent research. As Stringer (2006:18) notes in a tone of jubilation: "The year 1859 was…critical for our understanding of human prehistory. Despite a few waverers and doubters, the tide finally turned in favour of the concept of humans as part of an ancient world inhabited by distinct and extinct faunas, and the floodgates were opening". At least two weighty tomes, *Geological Evidences of the Antiquity of Man* (1863) by Charles Lyell together with *Prehistoric Times* (1865) by the archaeologist John Lubbock, quickly added nails to the coffin. A slew of archaeological publications founded upon the inherently racist assumptions of social Darwinism followed, so as to swamp serious opposition with empirical examples of 'lesser stone-age intellect' among so-called 'foreign savages'. There was no turning back.

### Tweaks and Refinements

True to Thomas Kuhn's (1962) tenets, however, the paradigm shift of mid-19th century archaeology still needed to build momentum before it could *dominate* both the intellectual *and* popular landscape. In 1856, Johann Fuhlrott found the bones of what became *Homo neanderthalensis* in a cave in Germany. Neanderthal people were soon portrayed as dull, hairy, lumbering hunch-backs in the popular press. Later that same century, archaeologists challenged the assumption of Louis Agassiz that there had been just one major ice age. In 1909, Eduard Bruckner and Albrecht Penck set out to show (from glacial mounds of debris) that there had been four distinct ice-ages in the Alps. This idea was superseded by a more complex model of over 20 cycles of ice sheet advances followed by interglacials. Minor tweaks to the new orthodoxy became a preoccupation of the career-motivated, whereas dissenters lost tenure or were simply ignored.

A second minor paradigm refinement spanning the 19-20th centuries was the extension and further sub-division of the stone age, initially into two periods: old stone age (palaeolithic) and new stone age (neolithic). The old stone age was once again subdivided into lower, middle and upper periods, the former of which was occupied by early tool-makers millions of years old. Radiocarbon dating, meanwhile, became popular in the 1950's and gradually led to an isolationist model of cultural origins replacing the biblical (diffusionist) West-Asian radiation model. Then during the 1960s, some of the first tool-makers were tentatively identified with African fossils (from the Olduvai Gorge in Tanzania) named *Homo habilis* (handyman) and *Homo erectus* (upright-man) by Louis and Mary Leakey. Other stone tools such as axes, picks, scrapers, points and flat-edged cleavers were also found in Africa, India and the Near East. These were duly classified into different technological 'industries' evolving over hundreds of thousands of years, the empirical evidence being unashamedly manipulated, without fail, into the new ideological framework of deep history.

In more recent decades, genetic evidences from Allan Wilson and others have appeared to support the 'recent single origin' or 'out of Africa' hypothesis. This claims that all humans are descended from a single ancestor who lived 100,000 years ago (Oppenheimer, 2004). This is now providing the context for a lively debate about the rise of modern humans. And so, leaving "prehistory" behind we arrive at the dawn of written history proper with the protoliterate period of Mesopotamia (3750-2900 B.C.) and the dynastic period of Egypt, usually dated 3100 BC in the Early Bronze Age I. Here ancient history may legitimately take up the tale. Or so we are "reliably informed"!

### Critically Evaluating the Current Paradigm

Many lines of criticism could be levelled at the current paradigm of deep history. Our approach will be to examine just some of the more glaring problems, at the same time showing how they might be better explained through the lens of the original catastrophist paradigm.

### Global Signs of an Ancestral Koine

Let us begin, then, by revisiting the first expressions of dissatisfaction with the original paradigm as articulated by Da Vinci. He jotted down that seashells found at high altitude were far more ancient than any written record of an extinction level event *large enough* to deposit them at such elevation. He also assumed, in the early 16th century, that there wasn't one such record in existence. Yet in this assumption he was quite mistaken, for laying aside Aristotle's rare 'winter flood' (or *kataklysmos*) in *Meteorologica,* since Leonardo's day many such accounts have now been excavated from ancient royal libraries.

Cuneiform tablets from ancient Mesopotamia, including tablet 3 of the Epic of Atrahasis, tablet 11 of the Epic of Gilgamesh and fragment CBM 13532 from the Temple Library at Nippur all record such a universal cataclysm in remarkable detail (c.f. Cooper, 2011, Chen, 2013, Finkel, 2014). The Egyptian *Book of the Dead of Anhai,* together with Pyramid texts, Coffin texts and *Papyrus Leiden 1350* record the same event under the rubric of the Hermopolitan 'cosmogony' (far better understood as a 'rupture' and re-population story).

This 'cosmogony' – actually the account of a sacred twin-peaked hill upon which human life was reborn with an ogdoad (or octuplet) of ancestors – could constitute part of a codified "cultural *koine*", what Marinatos (2010) defines as an international "vocabulary of sacredness, most of which revolved around the sun".

These sacred 'twin-peaks' appear variously expressed on Egyptian temples, Minoan cylinder seals, tablets, ring impressions and even Babylonian/Akkadian artefacts. Such a *koine* may extend as far as India and beyond, where in the Hindu *Rig Veda, Atharva Veda* and *Satpatha Brahmana* we find written reference to a cataclysm survivor named Manu, together with seven other 'ancestral sages'. Hundreds of similar accounts are now known globally. In this respect, modern archaeology has substantially corroborated the original paradigm it once operated under, leaving the current paradigm to flounder in culpable silence.

Another way in which the authority of the past has risen phoenix-like from the ashes is that former claims from antiquarians such as Eusebius and Nanni (neglected since Scaliger and others cast them all in such doubt) are also being substantially corroborated. For instance, ancient long distance trade networks known from these traditions were once considered fabulous. Since 1982, however, the varied cargo of the ship-wreck of Uluburun has proven them perfectly reasonable (as have discoveries like the exotic obsidian and amber minerals found at the Jomon site of Sannai-maruyama in Japan). Who knows? It is quite possible that neglected accounts spanning the five historic ages of Hesiod may yet precipitate *further* remarkable finds, akin to the discovery of Homer's Troy by euhemerists Calvert and Schliemann in the 19th century. The tomb of Sesostris (the Egyptian Hercules) is one possible avenue of further research. Roman historians such as Pliny believed it to have been built by his famous army upon a circular river island near the city of Lixus in Morocco. Is it mere coincidence then that the largest megalithic stone circle in the world (~1350 B.C.), built in the European style, now stands landlocked just 10 kilometres upriver from Lixus? (c.f. Mavor, 1976:89-122). Ancient records read in the light of 21st century field studies are revealing an accuracy hitherto thought impossible by the challengers of the early paradigm.

### A Stone Age turning to Sand

Questions must also be raised over the validity of Mercati and Dugdale's association of human worked stones with a 'stone age' of inchoative hominid intelligence. Obviously, stone is inferior to many materials sourced by humans. However new evidence should give us pause. It is well known, for example, that whilst excavating a trench in Africa, Mary Leakey discovered a circle of stones in Bed 1 of the site Douglas Korongo (DK), at Olduvai Gorge, Tanzania. It is less well known that she connected this discovery with the Okombambi people of South West Africa, who today build circular shelters of wooden branches by using similar stone walls to hold branches in place (Leakey, 1971:xiii). This was embarrassing because Bed 1 of site DK seemed occupied around 1.75 million years ago – far too early for the paradigm to accommodate modern behaviour! The evidence was consistent with a hut foundation-wall probably built during the Early Bronze IV or even later. Given a lot of head scratching and perspiration it was duly reinterpreted as a natural formation incorporating some bedrock.

Yet empirical flack remains which the new paradigm cannot hope to absorb, even if we consider a supposedly later campsite such as that found at Bilzingsleben in Thuringia, Germany (Mania et al. 1994). This site, dated to 400,000 before present, was found to contain one circular and two oval concentrations of artefacts, together with large stones and bones which could have been used to build walls. Is it reasonable that humans from the 'lower old stone-age', capable of making fire through friction, designing symmetrical tents and carving stone figurines of the goddess Venus, spent some 380,000 years just learning to link stone conurbations into larger cities? Given equal cognitive and aesthetic sophistication apparent in both archaic and modern humans, would not a global maritime civilization have arisen as early as 375,000 years ago within such a scenario? Clearly aware that 'the Emperor has no clothes', archaeologists usually fall back on the nebulous argument that climate change, disease, tectonic activity or famine must have retarded the rise of large permanent dwellings for over a million years. Yet what justification is there

Cuneiform script on clay tablet from beginning of first millennium B.C. © C. Benedek, www.istockphoto.com for this explanation? In short, none at all. If we set *Homo erectus* (better understood as recent, culturally-isolated aborigines) within the context of their external conditions as navigating pioneers relying on a subsistence-economy, the original paradigm of a West-Asian radiation event in the Early Bronze III appears far more realistic.

The current paradigm is equally threadbare when one considers stone tool 'industries'. Returning to Mary Leakey's *faux pas,* we find her admitting of the Kanapoi Valley in Northern Kenya: "… the occurrence of an industry restricted to heavy duty tools of Lower Palaeolithic facies associated with pottery and hut circles, is an anomaly hard to explain. It may be noted, however, that a crude form of stone chopper is used in the present time by the more remote Turkana tribesmen in order to break open the nuts of the doum palm" (Leakey, 1966:581). The following observation of Hartwig-Scherer (1991) is most cogent: "There is growing discussion about the extent to which the type of stone tool depends on external conditions… rather than an evolutionary process or the intelligence of the manufacturer. This also accords with studies of peoples today that have stone cultures: Palaeolithic work places can easily be compared with counterparts today, such as in Australia. The type of tool does not allow one to draw conclusions about the manufacturer's mental capacity." Stone tools are indeed used *today* by isolated tribes in the highlands of New Guinea and in Paraguay, South America. They look remarkably similar to their 'Acheulean' counterparts. Therefore the simplistic association of time period with cognitive capacity in tool manufacture has failed spectacularly!

In 1984, Eileen O'Brien noted that large concentrations of hand-axes were to be found in many European river gravels and ancient dry lakes, often associated with exotic mammal bones. Others were found embedded in the earth *in situ* (point first). This seemed consistent with a hunting-projectile function, perhaps used to distance-kill semi-aquatic fauna such as hippos. Given the investment of time and skill used to work these stones, losing them underwater seemed the best explanation for why such high concentrations were to be found in localised areas. To test this hunting hypothesis, O'Brien had a 2 kilogram precision replica made of a larger specimen. Its aerodynamic properties were examined via professional discus throwers. Statistically, she discovered that when thrown its aerodynamic properties enabled it to land edge-first 90% of the time and point-first 70% of the time, leaving behind deep lesions in the soil. Samson (2006) has since enlarged O'Brien's dataset and corroborated these results, as has perhaps the rare discovery of a broken Levallois point found deeply embedded in the backbone of a wild ass (Boëda *et al.* 1999). Such a discovery is consistent with a heavy, high inertia projectile possessing well over 100 joules of impact energy, striking from a parabolic (thrown) trajectory. Considering external conditions, perhaps vast mobile maritime armies of the mid-second millennium B.C. manufactured such weapons from stone since metal ore mining could not cope with their huge demand.

Even more remarkable has been the discovery of at least 30 of these stone axes at nine different locations along the coast of Crete – prime territory for a lost civilization led by Jupiter Ammon (Strasser *et al.* 2010, Menzies, 2012). Revealing an obtuse attitude towards the early paradigm, Boston University archaeologist Curtis Runnels expressed shock: "I was flabbergasted, the idea of finding tools from this very early time period on Crete was about as believable

Titus Flavius Josephus, a Romano-Jewish historian and hagiographer of priestly and royal ancestry. An engraving published in London by L Tallis. © Georgios Art, www.istockphoto.com as finding an iPod in King Tut's tomb". The extent of cognitive dissonance generated by such 'very early' tools on Crete is seen in these axes apparently dating to just 130,000 years before present. Were they found only 200 miles away on the continental mainland, we would venture a date almost ten times that age – yet sophisticated watercraft required to reach Crete *cannot* be admitted this early! Even so, consternation must stem from the vast gap of 125,000 years between these international mariners and their Bronze Age Egyptian, European, Phoenician and Mesopotamian descendants. Moreover, one of the earliest dugout pine-log canoes, found in Holland, dates to only 8200 B.C. Consistent with the external condition of a lack of wood, petroglyphs (stone paintings) and cuneiform tablets record the earliest watercraft of Egypt and Mesopotamia as large complex reed-ships. Realistically, these ancient works of maritime artistry date to the Early Bronze IV period (2200 BC) - not much earlier. Therefore it is patently absurd to suggest that humans capable of art (such as Neanderthals) were navigating oceans for 125,000 years (25 times the length of recorded history) without leaving any discernable evidence. Within no more than 5,000 years, such evidently cultured and capable ocean mariners would have *undoubtedly* mapped the currents, explored the entire globe, left ample artwork and built vast stone cities comparable to Thebes, Argos and Babylon!

## Unspinning The New Family Flintstones

Considering Neanderthals further to emphasise the extent of this Cretan nightmare, we note that their earlier image as hairy beasts has been transformed so they are now thought of as either humans of great longevity (as found in the Genesis genealogies) or essentially modern humans physiologically adapted to a cold environment. Evidence suggests they ceremonially buried their dead, painted their cave dwellings with considerable talent and also offered flowers as grave offerings. Far more consistent with a global West-Asian radiation event in the Early Bronze III, Trinkaus and Shipman (1993:412) note that the Neanderthals had: "…to the best of our knowledge – the capacity to perform any act normally within the ability of a modern human…[whereas] their bulky trunks and relatively short limbs and digits are designed for conserving metabolic heat in near-arctic conditions". This perhaps reflects recent archaeological evidence which would place them in caves as far north as the western Ural Mountains near the Arctic Circle. As radiating pioneers braving harsh northern climes with cognitive equality to 21st century humans, Neanderthals can be correctly located within a more recent historical context.

## Conclusions

Merely by focusing upon a few of the most obvious problems within the current paradigm of archaeology in literary-essay style, we have found the whole ramshackle edifice unfit to remain standing much longer. Exciting prospects are therefore on the horizon, since once a paradigm crisis brings about a shift in academia, whole new vistas open up for a subsequent generation to explore and develop in detail. The future of archaeology is bright because it's highly unlikely the darkness of deep history will overshadow empirical evidence forever. Nevertheless, if you are reading this article thinking that the evolutionary paradigm is far superior, then borrowing a few words from T.S. Eliot, we hope that at the end of all your exploring you will have arrived, full circle, where you started – and "know the place for the first time". ■

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# Diseases and Illnesses – did God create them?

## Nancy Darrall

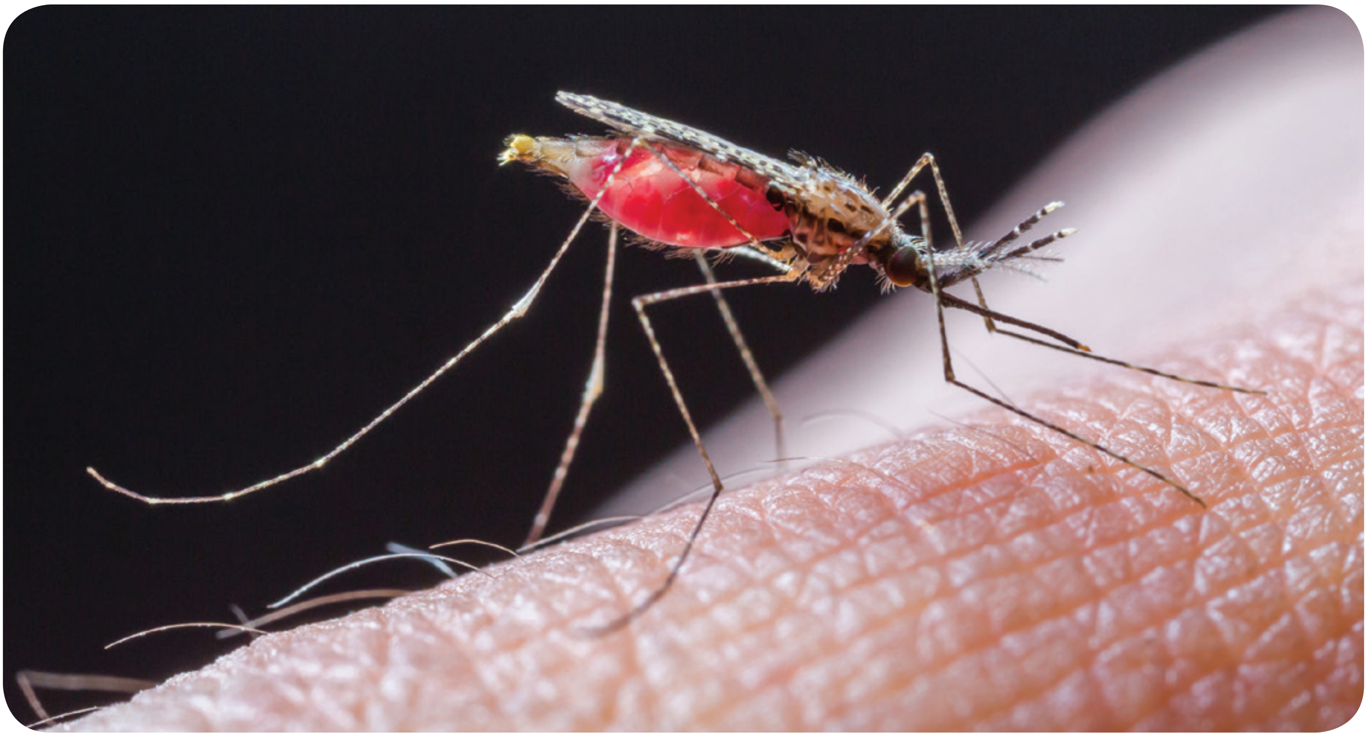
In Scripture, we read that the original creation was "good" and "very good". Yet today many suffer illnesses from a minor cold to life-threatening malaria, and crops can be slightly below standard or totally devastated by blight, rust or mildew. We can trace the origin of illnesses and disease to Genesis 3 and the Fall, but there is no reference to a further creation here after God finished his work of creation in Genesis 1. On the other hand, their creation within the time frame of Genesis 1 and 2, before sin entered the world, would contradict the description of the created order as "good" and "very good" (a well-discussed topic, e.g. Wilson, 2004). This article provides a fresh look at this dilemma, drawing examples from the scientific literature.

### Malaria and Mosquitos – A Case Study

**Introduction**

The sequencing of the human genome and subsequent explosion of interest in sequencing a wide variety of plants and animals has provided a wealth of new information to look again at these issues. Malaria provides a good case study as it involves the unicellular pathogen, a vector, a host and a variety of environmental factors. After discussing this disease, some other cases are examined.

Malaria is one of the most devastating diseases of the tropics. Estimates suggest that over 650 million people are infected with malaria in the world and that about a million people die every year. The parasite that causes the illness (*Plasmodium* spp.) lives in the mid-gut of the mosquito and is transmitted to humans when an infected female mosquito pierces someone to get a blood meal. Once a person is infected, the parasite lives in and feeds on their red blood cells. There it reproduces and the next generation of the parasite is released into the blood stream to infect other cells. A further feed by a mosquito transfers



Mosquito sucking blood ID 30286852. © www.dreamstime.com the parasite back into the mosquito so completing the life cycle.

This parasite is widespread in wild-living chimps and gorillas where there appear to be no ill effects, although primates in captivity infected with human strains do develop symptoms (Paupy, 2013).

### Gene Loss and Gene Duplication make *Plasmodium* Dependent on Host

*Plasmodium* is a single-celled organism, a member of the Chromoalveolates which contains predominantly free-living forms but also some parasites. DNA sequencing reveals great similarities between the free-living and parasitic members and points to a single ancestor living in primates that later diversified. It is thought likely that cross infection with humans occurred by close contact with primates, possibly through keeping them as pets.

**DNA in the mitochondria.**

Mitochondria are structures (plastids) in cells primarily involved in energy release. The DNA in the mitochondria of *Plasmodium* spp. has undergone dramatic changes in size, organization, and encoding functions compared with the free-living organisms. It is unusually small and has been described as a relic. It contains only three genes, which means that the genes coding for many key metabolic components are absent. Interestingly, those three genes are present as multiple repeats, the same as the genes found in very similar, free-living dinoflagellates. For example there are 150 copies of one gene in *Plasmodium yoelii* making up an amazing 3% of the DNA. These genes code for proteins that are essential for the release of energy within cells. The high numbers of repeats can be considered an adaptation to life in a host, by increasing the activity of these enzymes. However, they are merely copies of genes that are already present in the free-living forms (Foth *et al.,* 2005; Vaidya and Mather, 2009).

**DNA in the chloroplast.**

Chloroplasts are another type of plastid within the cells of plants and algae. Their primary role is to capture energy from light to synthesize carbohydrates. In *Plasmodium* there is a "relict plastid" (apicoplast), so similar that it is thought to be "a legacy of the malaria parasite's distant photosynthetic ancestry" (Ralph, 2004). It encodes only 30 enzymes. A large proportion of the genes are devoted to evading the immune reaction of the host and enabling host-parasite interactions. For example, it produces chemicals called terpenes through metabolic pathways normally found in chloroplasts. These are breathed out by the host and are attractants for the mosquito, so enhancing disease transmission from one person to another (McSpadden Gardener, 2004; Kelly *et al.,* 2015; Kohler *et al.,* 1997).

### Increased Activity of Gene in a Mosquito responsible for Switch to Human Host

One mosquito subspecies, *Aedes aegypti aegypti,* lives in forested areas. It prefers to feed on forest animals and appears to do so without causing harmful infections. However, another subspecies, *A. aegypti formosus,* prefers human blood and has spread yellow fever, dengue, and chikungunya viruses widely across the world. This subspecies seems to have emerged recently and contains a number of mutations. Fourteen genes were strongly linked to the preference for humans. One of these, *Or4,* is highly expressed in the mosquitos that crave human blood (McBride *et al.,* 2014). Here we have increased activity of a gene that is already present causing host-switching and the emergence of these diseases in humans.

### The Mosquito's Gut Flora are Gate-Keepers of the Malaria Disease

The human body is host to a variety of organisms including a diverse and complex microbial community. A healthy gut flora is known to protect against a variety of diseases, such as illness from *Clostridium difficile,* by direct inhibition of those bacteria that cause diseases as well as by stimulating the immune system of the host. The gut of insects is no different. Two bacteria, *Wolbachia* and *Chromobacterium,* are amongst those often found in the gut of insects. Such insect-bacteria associations are known to affect the ability to transmit malaria and also the dengue virus to humans. *Wolbachia* directly inhibits survival of both the larval and adult stages of *Plasmodium* in mosquitos. It does this by activating immune responses and producing substances that directly inhibit the pathogens. As the gut flora is inherited maternally, there are trial programmes in northern Australia to inoculate mosquitos with *Wolbachia* to block disease transmission to humans (Hoffman and Turelli, 2013; Ramirez *et al.,* 2014).

So, infection with a *Plasmodium* sp., which has degenerate DNA and the lack of a normal member of the gut flora, *Wolbachia,* can transform the mosquito into the carrier of a devastating disease.

### Environmental and Behavioural Factors affect Malaria Transmission

There are over 500 different species of mosquitos but only about a dozen carry the malarial parasite. All adult mosquitos feed on the nectar and honeydew of plants and this provides enough nourishment for both males and females to live. However, before they lay eggs, females of those mosquito species that cannot store enough food supplies from their larval stage require a blood meal. The same slender, sharp mouthparts used for penetrating plant tissues are used for sucking up blood. The saliva of blood-feeding mosquitos contains a wide variety of components that work synergistically to counter the defence mechanisms in animals and plants, to aid digestion and to enable the mosquito to draw up fluids. The contents of the saliva are adjusted by the mosquito depending on the food source (see Chagas *et al.,* 2014).

Since only a minority of mosquitos require a blood meal, it is thought to be an adaptation by a few species in conditions where their plant food sources are now less rich in nutrients. An interesting parallel is found in the kea, a parrot that has colonised the harsh mountains of the Southern Alps on South Island, New Zealand. Parrots generally feed on plants, and the closely related parrot on North Island is no exception. However, those kea that have colonised the poorly vegetated Southern Alps have developed carnivorous strategies, as in the winter, when food is scarce and the climate harsh, many can die. Some kea will dig chicks of sooty shearwaters from their burrows to eat. Others have adapted to feed on carcasses of animals in sheep farming areas. Some even attack live merino sheep in the high hills, feeding on the fat layer beneath their woollen coats. In these conditions, the environmental stress has led to a change in behaviour; the same beak that is used to dig up plants and forage for fruit and nuts is able to attack the shearwater chicks and sheep. The total destruction of soil and plant communities at the Flood in the time of Noah is likely to have precipitated many such changes in feeding habits as the post-Flood world would have been a very impoverished place. It is notable that Noah was given animals for food after the Flood, suggesting that plants alone would not provide adequate nutrition.

## Same Patterns – Other Diseases

### Gene Loss

Leprosy and tuberculosis (TB) are two devastating diseases and the bacteria responsible belong to the genus *Mycobacterium.* While some are free-living organisms with large genomes, (e.g. *M. smegmatis,* 7Mb), leprosy is caused by a member of this genus with a much reduced genome, only 3.27 Mb. Comparisons show that it is closely related but has lost more than 2,000 active genes through deletion or decay, eliminating many important metabolic functions and their regulatory networks. Only 391 soluble proteins are produced, compared with an estimate of over 6,000 from the very similar, free-living *M. smegmatis.* Similarly, *M. tuberculosis,* the cause of TB, has a genome of 4.4Mb and only 1,800 soluble proteins. Here are two examples of diseases where originally free-living bacteria now have a degenerate genome and so need to live within the human body to survive.

Reduced genome size is not restricted to bacteria that cause harmful diseases; it is also found in bacteria that form mutually beneficial partnerships with their hosts, such as the members of our gut flora. One example is *Escherischia coli,* which is beneficial in several ways including provision of Vitamin K, assisting our immune system and breaking down waste. In the protective environment of the host, many substances needed by the bacteria are readily available from the host. This means that the bacterial genes to synthesize them are redundant and are eliminated. The consequences are positive or deleterious only from the perspective of the host; we call them symbionts or pathogens respectively depending on whether disease symptoms occur (see Cole *et al.,* 2001; Francis 2003: Pirofski and Casedevall, 2012).

## Gene Duplication

Disease symptoms are often caused by overproduction of substances normally present in cells to levels that are harmful or toxic. This does not require new genes; it is achieved by multiple copies of the same gene, or a change in the regulation of gene activity, or both. This process is not limited to pathogens; symbionts often have multiple copies of genes which code for nutrients that the host cannot synthesize.

**Animal diseases.** The pathway of pathogen development from a free-living organism can be traced in *Toxoplasma gondii,* responsible for toxoplasmosis, a disease we commonly associate with cats. The degree of virulence of this pathogen is largely due to a gene, *ROP-5,* which belongs to the kinase family of enzymes found in plants, animals and yeasts. Firstly, there was a mutation of an original kinase gene, a key regulator of cell function, into a pseudokinase. Later amplification and diversification of this gene gave rise to a whole family of similar genes encoding the pseudokinases that are injected directly into host cells causing the disease symptoms (Reese *et al.,* 2011). Deletion of this gene cluster causes complete loss of virulence.

**Toxins in venom.** Venom toxins are found in a wide range of animals including snakes and are injected into another animal or human for defence or predation. They contain proteins and other substances that are similar to the products of genes required for the normal housekeeping functions of cells. These genes have been recruited and then modified and/or amplified, sometimes into large families of genes, which means that far greater quantities of the venomous protein(s) can be produced. In some cases, gene products are assembled in different ways (alternative splicing) to produce toxins. These genes encode a variety of functional activities and potencies and they act by blocking metabolism, destroying substances or preventing normal physiological responses (see Casewell *et al.,* 2013; Fry, 2005).

Plant diseases can devastate crops, Early tomato blight. © Makaid, www.istockphoto.com

**Plant diseases.** Repetition of sections of the genome is also a key feature of plant pathogens. Akin to our gut flora, plant tissues are colonised with a wide variety of micro-organisms. Some are beneficial to plant growth, such as nitrogen-fixing bacteria in legumes, while a few cause serious diseases such as rust fungi on cereals, mildews and potato blight. Sequenced genomes of pathogens are very similar to those of the free-living forms. One notable difference is that there has been extensive proliferation of regions of repetitive DNA. In the fungus that causes potato blight, *Phytophthora infestans,* these regions can comprise up to 74% of the genome. The DNA codes for enzymes important in breaking down the cell wall of the host; the more copies, the greater amount of enzyme produced, and so the greater virulence of the disease. This process of gene amplification is not confined to disease development and symbiosis. It is one of a whole raft of important, beneficial processes that allows organisms to adapt to stressful environments and survive in extreme or variable conditions, for example in soils with high levels of heavy metals (see Rafaelle and Kamoun, 2012).

### Other Processes – Acquisition of Plasmids

Organisms such as bacteria and fungi undergo sexual reproduction by exchanging genetic material during temporary joining or permanent fusion. This allows plasmids, which are small pieces of DNA carrying additional information such as antibiotic resistance, to transfer as well. Increasingly, these transfers are known to be important in the rise of new diseases such as the transformation of *E. coli,* a beneficial member of our gut flora, into a dangerous pathogen causing diarrhoea and other, sometimes fatal, infections. The plasmid responsible is thought to have come from the disease-causing bacteria, *Vibrio cholera,* within the human intestine.

The bacterium that causes anthrax contains two plasmids. It belongs to the *Bacillus* cereus group of organisms. They are ubiquitous in the natural world, primarily in the soil but also commonly as part of the gut microflora of invertebrates. Some are intimately associated with plant roots in a symbiotic relationship and can promote plant growth, improve drought tolerance and suppress disease and insect damage. Many forms of *B. cereus* are known, varying greatly in lifestyle but with only very minor genetic differences in their circular chromosome. It is the genetic content of the acquired plasmids they contain that determines their ecology and their ability to cause disease. Anthrax contains two plasmids known as pXO1 and pXO2 that are responsible for their pathology. Another *B. cereus,* containing a variant of the plasmid pXO1, has been isolated as a cause of food-borne toxins responsible for gastrointestinal diseases. A single section of DNA in the pXO1 plasmid produces a family of peptides ranging from non-toxic to highly toxic (see Sozhamannan, 2006; Wood, 2002). There is evidence that during the process of peptide synthesis from the DNA of this plasmid, proof reading is not as rigorous as usual and this is responsible for the diversity and enormous variation in disease symptoms.

Plasmids can influence a wide variety of traits, not just disease virulence and antibiotic resistance. They may be hugely beneficial, transferring traits necessary for accommodation to a symbiotic lifestyle as well as enabling free-living bacteria to have the versatility to adapt to, and remain fit in, changed environmental conditions (see Dobrindt *et al.,* 2004; Rasko and Rosovitz, 2007; Schuh and Fischetti, 2009). However, bacteria that have a symbiotic lifestyle can more readily become pathogens because they already have the features necessary for life in close proximity to a host. All that is required is that the symbiont gains a further trait causing damage to the host as in the case of the toxic peptides produced by pathogenic *E. coli.*

### Combinations of Genetic and Environmental Factors

Most pathogens and symbionts have probably adapted to living within a host by a combination of gene loss, gene duplication and plasmid acquisition. Damaged and poor environments also play a big role. A couple of examples will suffice.

Buruli ulcer is an emerging disease associated with disturbed tropical wetlands, a good example of multiple changes in the transformation of a free-living organism into a serious pathogen. The causative agent has been called *Mycobacterium ulcerans.* It has an almost identical genome sequence to *M. marinum,* a ubiquitous fast-growing species living in water where it is associated with plants and algae. In contrast, *M. ulcerans* is associated with slowly flowing or stagnant watercourses. It has lost around 23% of its genes and acquired a virulence plasmid that carries multiple copies of a gene giving it the ability to produce the polyketide mycolactone. Polyketides are one of a large class of compounds produced by bacteria, fungi and plants. It is the high levels of mycolactone produced by the multiple gene copies in this pathogen that are toxic, not only suppressing the innate inflammatory responses to infection but also causing tissue damage. Mild ulceration of the skin can progress to massive tissue destruction but with minimal inflammation (Demangel, 2009).

A very similar set of changes has been uncovered in a fungus disease of poplar trees. Horizontal transfer of DNA from fungi associated with wood decay has combined with up-regulation of genes encoding hemicellulose-degrading enzymes. This has allowed the fungus to colonize poplar woody stems causing the lethal canker on leaves, stems and branches (Dhillon *et al.,* 2015).

Another example concerns *Yersinia* species, most of which are free-living bacteria that do not cause disease. However, three species are known to be human pathogens: the plague bacillus *Y. pestis,* and two others that live in the gut, *Y. enterocolitica* and *Y. pseudotuberculosis.* A survey of the currently known species shows acquisition of virulence plasmid(s) followed by further changes, including functional gene loss and reduced metabolic flexibility, compared with free-living forms *en route* to pathogenicity (Reuters *et al.,* 2014).

Lyme disease is an increasingly common and potentially serious disease we can pick up from ticks harbouring the bacterium, *Borrelia burgdorferi.* This pathogen contains at least 17 linear and circular plasmids, the combined size of which is more than half as big as its chromosome. They include sections of multiple repeats of plasmid genes. The biological significance of these plasmids is not yet clear but is thought to enable the bacterium to evade host defences. Environmental factors are also important in controlling infection. Where native vertebrate diversity is high, the ticks feed from a wider variety of hosts, many of whom are poor reservoirs for the pathogens because of their natural immunity. So, this disease was unknown until recently. However, when diversity is reduced to a few species, such as deer, sheep and people, infection is more likely, as the pathogen can adapt to these few hosts and build up a reservoir for future transmissions (Fraser *et al.*,1997).

## Environment and Behaviour – A Balanced Ecosystem is Protective

**The ecosystem of the human body.** Some people are carriers of disease; the pathogens live in them but there are no disease symptoms, whereas in others there can be a catastrophic reaction. In TB, it is the immune reaction of the host that results in the disease symptoms of severe lung inflammation and tissue damage. In whooping cough it is the strong inflammatory response to the diphtheria toxin that causes the fatal obstruction to breathing. These diseases would not exist if the immune response was less or if the bacteria did not produce the toxins; here the relationship would be neutral or symbiotic. A healthy human gut flora is a good example of such a relationship. Another important example is the community of bacteria, fungi and animals in the soil.

**Soil organisms.** An ecosystem where there is a diverse array of organisms protects from parasites, pests and diseases. In the soil, bacteria can multiply to very high levels around and also between the cells in the roots of plants where there is an ample supply of nutrients. These bacteria (rhizobia) protect plants from fungal pathogens, bacterial diseases, insect attack and infestations with nematodes. Some soils are so well-endowed that they are known as disease suppressive soils. Although rare, they provide examples of what a healthy soil could provide for plants and crops. Rhizobia suppress disease through competition for nutrients, production of antimicrobial compounds and enzymes that destroy the cell walls of fungi and nematodes.

One example is that of muskmelons, which have been grown since antiquity in the Châteaurenard region of France with little trouble from *Fusarium* wilt even though the fungus is present. In nearby regions the disease is so severe that sometimes cultivation of the crop is abandoned. Plant growth-promoting bacteria are now being exploited commercially for protection against various pests and diseases. However, resistance tends to decrease with time showing that by and large our present-day soils are not able to support the microbial population necessary to support healthy plant growth (Persello-Cartieaux *et al.,* 2003; Ramamoorthy *et al.,* 2001; Schroth and Hancock, 1982). This is a predictable outcome of the biblical account of the worldwide flood at the time of Noah. The flood covered the land surface of the whole earth for a large part of a year. The soils created in the beginning would have been completed destroyed by this event. Soils formed afterwards would have come from flood deposits of rotting animal and plant material mixed with mud, silt and sand.

## Conclusions

Organisms living in close association with a host obtain a variety of nutrients from them and so no longer need to synthesise them. The respective genes are then lost which means that those organisms are then no longer able to survive without the host as free-living organisms. When both benefit from the association it is known as symbiotic, but if other genetic changes occur as discussed above the host is harmed and we describe the outcome as a disease.

Gene mutations, amplification and/or changes to the activity of a gene(s) lead to excessive levels of normal metabolites, causing such things as the damage in diseases and the toxicity of snake venom. Similarly, host over-reaction or susceptibility can lead to disease symptoms.

Infectious diseases cause suffering and death to millions in the world today.
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Plasmids with benign metabolic functions in a non-pathogenic organism can be transferred into an organism that is closely associated with a host. These products can then have harmful effects in the host and a disease is born.

Competition from members of a diverse free-living and symbiotic ecosystem can minimise the survival of pathogenic forms, both in living organisms and in the soil. Reduced diversity, or an imbalance, provides conditions for disease build-up and infection to occur. The Noachian Flood would have destroyed the original soils and left an impoverished ground surface vulnerable to such problems.

This article provides examples of how diseases may arise from the degeneration of free-living forms: by small changes in DNA, by duplications, by lax proof-reading of genes and their products, and by the transfer of genetic material between organisms. It is not necessary to invoke their creation after the Fall or their existence before the Fall. ■

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# Types of Animal Form

## Evidence from nature accords with the Creation account

Lindsay Thompson PhD

The great diversity of animal forms we see today is often presented as being united together in a "phylogenetic tree" originating from a single, primitive ancestor. This view appears to be at loggerheads with the Creation account in Genesis, in which complex animal forms (such as birds) were present at the beginning. However, the following account indicates that the evidence from nature compellingly supports the Creation narrative.

### Section 1:
### The Evidence Base – Hybridization data.

Cross-breeding between species (i.e. inter-specific hybridization) is very common. Abundant data for this exists for birds, mammals, plants and invertebrates such as butterflies. For instance, at least 1 in 10 species of bird hybridize with another species (Grant and Grant 1992). Over 14,000 inter-specific hybrid rhododendrons have been registered with the Royal Horticultural Society. Analysis of such data can indicate which species and genera may be united by hybridization. For hybridization between species to produce live offspring at all, they must share an embryological machinery that is compatible when egg and sperm of the two parent species unite and full development ensues. Thus this method (which employs hybridization data) rests on an empirical basis (i.e. evidence-based), in which the members of a group must share a common developmental plan. Below are a few examples of groups distinguished in this way, which can be denoted as hybridization groups (HGs). The data is drawn from sources including academic journals, breeders' records, museum specimens, International Zoo Yearbook records and field reports, cited in the following publications: Mammalian Hybrids (Gray, 1972); Bird Hybrids (Gray, 1958); and Avian Hybrids (McArthur, 2006).

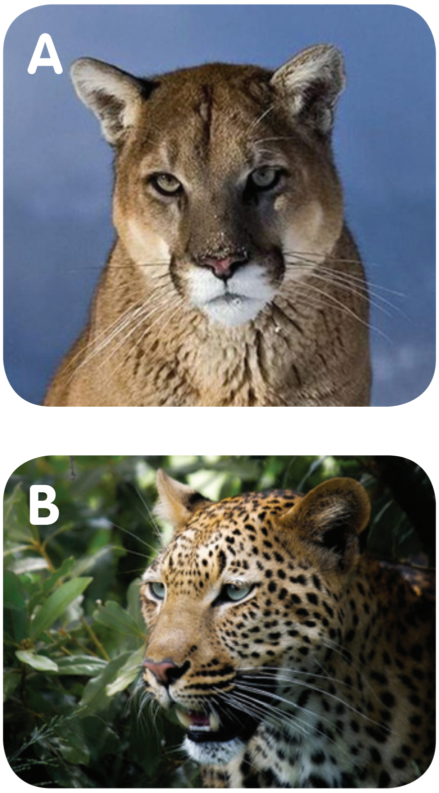


**Fig 1.** Various species within the cat family can cross-breed (hybridize), e.g. A. *Puma concolor* (puma) x B. *Panthera pardus* (leopard). This is also one of many instances of hybridization between species in different genera.
A © Presumed to be in the public domain
B © Arno Meintjes

***The Cat family (Felicidae).*** Hybridization unites not only different species, but also links several cat genera together. For instance, two sub-families (Pantherinae and Felinae) are generally recognized within this family (Wilson and Reeder, 2005). However, the above cross links together these sub-families (according to the taxonomy recognized by Zhang and Zhang, 2013), indicating they share a common developmental plan.

Some of these crosses are fertile, e.g. *Prionailurus bengalensis* (leopard cat) x *Felis catus* (domestic cat). Indeed, this cross was the basis for generating a new pedigree domestic breed, the Bengal cat. When a Ruddy Abyssinian cat was bred with a Seal Point Siamese, then backcrossed to another Siamese in the next generation, the surprising outcome was a spotted cat resembling an extinct Egyptian breed. This is now another accepted new rare breed known as the ocicat (Figure 2), because of its resemblance to the ocelot. Neither parent breeds were ever known to express such spots. The ocicat spots are an example of an atavism – the reappearance of a character known in distant ancestors and not seen in the parents or recent ancestors (Hall, 2010).

***Old World Monkeys (Cercopithecoidea)***. Eight out of 9 genera are connected through hybridization. This links together diverse forms such as the baboons, macaques, mandrills and Barbary apes.

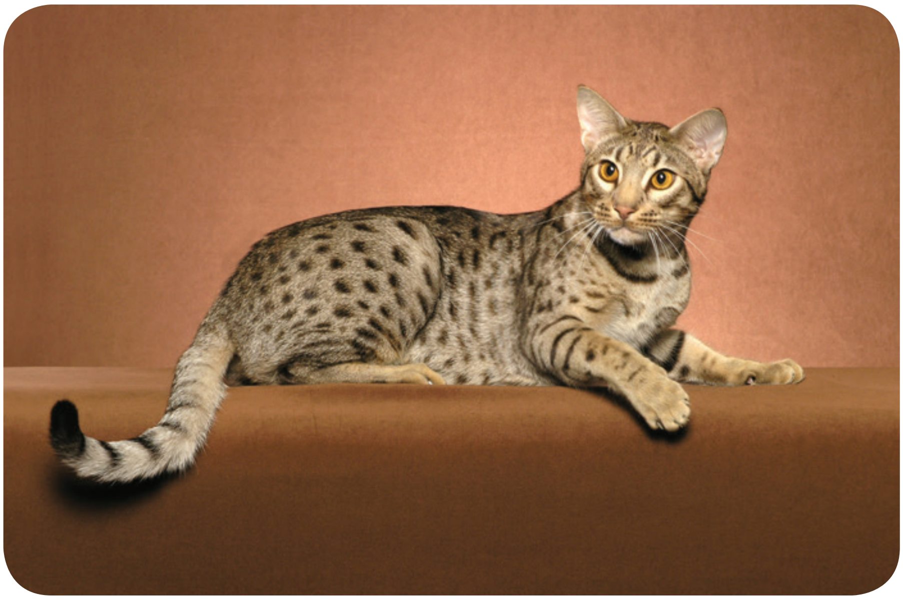


**Fig 2. Ocicat:** Bred from 2 pedigree breeds, neither of which express these spots, indicating that the parents possess a hidden ancestral character known as an atavism. © Helmi Flick

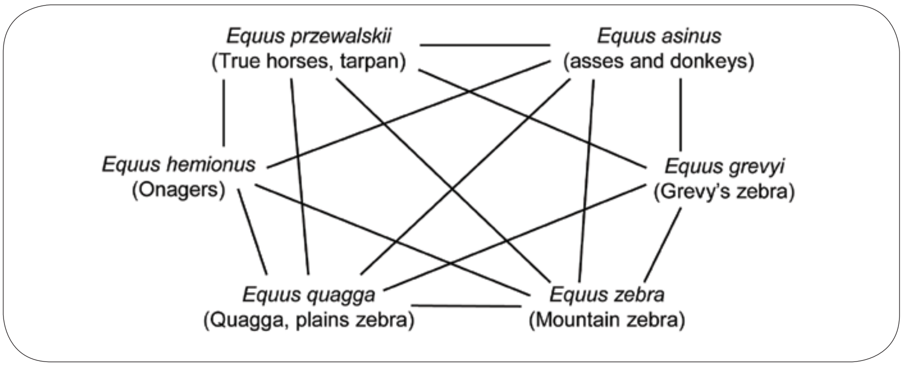


**Fig 3.** Hybridization (indicated by lines) links together all of the species in the horse family (Equidae).

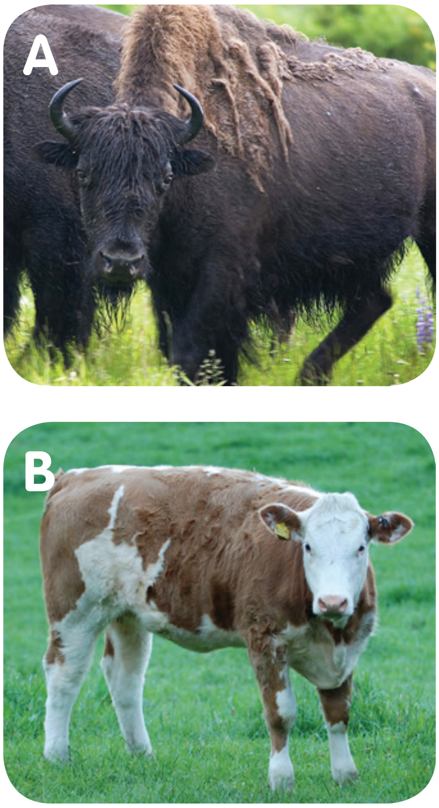


**Fig 4.** Hybridization can occur between different genera within Bovidae, e.g. A. Bison (Genus: Bison) x B. Domestic cattle (Genus: Bos). A. © US Fish and Wildlife Service B. © Lindsay Thompson

***The Horse family (Equidae)***. All of the species in this family are united by hybridization, i.e. horses, donkeys, asses and zebras hybridize together (Figure 3). They do not hybridize with their nearest taxonomic neighbours (the tapirs and rhinoceri). This data, combined with their distinctive horse-like form, such as numerous skull and dental characters (Anderson and Knox Jones, 1984) clearly separates them from these neighbours.

***Bovidae.***
Hybridization unites yaks, bison, zebu and cattle (i.e. 2 genera – *Bison and Bos, Figure 4*)

***Cervidae.***
Deer-like species from 6 different genera can interbreed, linking together the elk, fallow deer, roe deer and chital. This also links 2 of the 3 sub-families together.

***Ursidae.***
Hybrids between 6 of the 8 species of bears can be found. For instance, the polar bear, American black bear, Asiatic black bear, sloth bear and sun bear are known to cross-breed. This also interconnects 4 of the 6 genera recognized by Wilson and Reeder (2005).

***Ducks, Geese and Swans (Anatidae).***
In general, the number of species able to hybridize together can be quite large. For instance, 128 species (81 %) of all Anatidae species hybridize. Twenty percent of all these hybrids are fertile, and over 30% of them also connect several tribes (a taxonomic rank between genus and family) (Scherer and Hilsberg, 1982).

***Storks (Ciconiidae).***
Seven of the 19 species of storks hybridize, uniting species ranging from those with slender to massive bills. Again, no hybridization between storks and other bird families is evident.

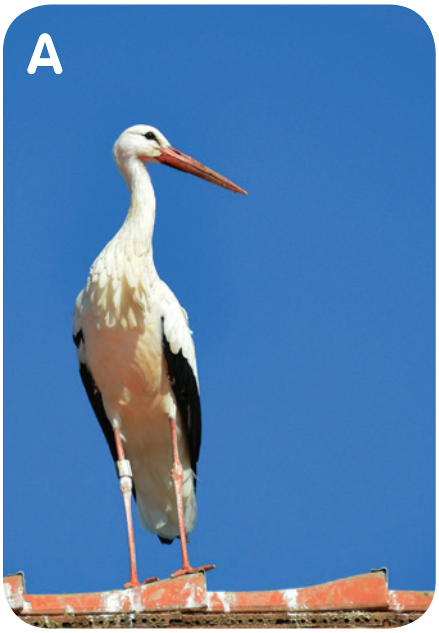
***Pelicans (Pelicanidae).***
Six out of 7 of all pelican species can hybridize together, but hybridization between pelican and any other groups is unknown.

## Implications.

These HGs listed above become apparent simply by collating the hybridization data. Appraisal of other hybridization data indicate over 100 further HGs can be obtained, just for birds and mammals alone, with many more likely among plants, and other taxa such as snakes. Some of these are analysed in more detail elsewhere (e.g. Crompton and Winkler, 2006; Hennigan, 2005, 2010). From this data analysis, the following themes emerge:

1. There is a high degree of hybridization within each HG, but none whatsoever outside of it, which suggests a deep natural division between an HG and any proposed neighbours.

2. The hybridization data accords with the outward appearance or form shared by members of the HG, for instance, the easily recognized "cat-like" form (Sicuro and Oliveira, 2011) shared by all cats united by hybridization. This is exactly what should be expected if the developmental plan of the hybridizing parents is compatible, which in turn produces the form typical of the group.



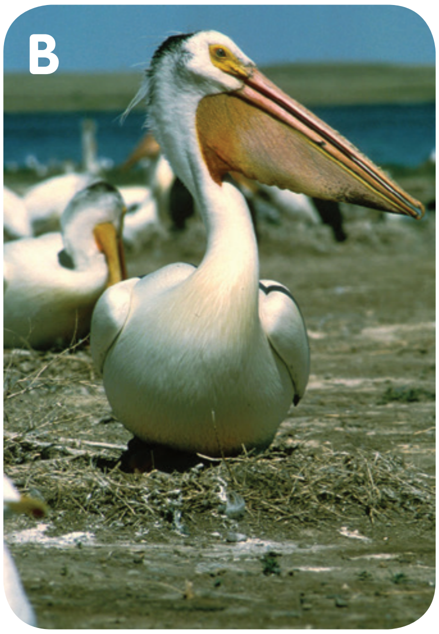


**Fig 5.** The stork (A) and pelican (B) "*min*" (kind) found in the Bible may represent a higher taxonomic unit such as the stork and pelican (B) families, rather than just species. "Reproducing after their own kind" can imply maintaining the basic ground-plan of that particular *min* over successive generations, whilst allowing variation within the kind. There is evidence to support this. © Pixabay, © US Fish and Wildlife Service in the public domain

3. Although members of the HG have a common essence of form, hybridization often links species with quite variable morphology, suggesting that the developmental plan is sufficiently compatible to generate hybrids between the varying forms throughout the HG.
4. The presence of atavisms is suggestive of a hidden ancestral reservoir of genetic potential distributed in the HG, suppressed until both parents possessing the hidden alleles breed together, allowing these alleles to recombine.
   According to Hall (1984), atavisms are the visible sign of an enormous hidden potential for morphology change possessed by all organisms, which would explain the capacity for members of the HG to exhibit a range of variations in form. Large subsets of genes, including transcriptional regulators, are known to be reprogrammed during hybridization, which could be driving the generation of new forms occurring during rapid speciation (Tsiantis and Hay, 2003). This could provide the mechanism for expression of this ancestral genetic reservoir.
5. The nearest taxonomic equivalent of the above HGs ranges from the genus to the family or super-family level.

## Section 2:
## The Genesis Kinds.

What exactly *were* the Genesis kinds? The original Hebrew word employed in the Bible to describe the animals is min. Examples of *min* can be found in Leviticus 11 and Deuteronomy 14:13-18, which list animals using collective words such as the hawk, eagle, owl, heron, stork, seagull and pelican. In these accounts there is a recurrent phrase referring to the particular animal "according to its kind." Also the Genesis account adds that God created these animals to "*reproduce* after their own kinds". Moreover, the word *min* always includes the *lamedh* preposition, which indicates reference to a formal standard (Williams, 1967). Together these ideas suggest that the *min* are distinct units of creation (Jones, 1972a).

### Understanding the Biblical text.

Although there are some uncertainties in the correct translation of the animal names from the original Hebrew, a number of key points emerge:

1. There is a real sense conveyed that each word in the list represents a wider group of animals, the members of which reproduce "according to its kind". Crucially, if this were just a species list, it would surely be much more exhaustive, for there to be no uncertainties as to which were the clean and unclean animals. With the rich species diversity in the Palestinian lands then even more than now, a species list would number in the hundreds.

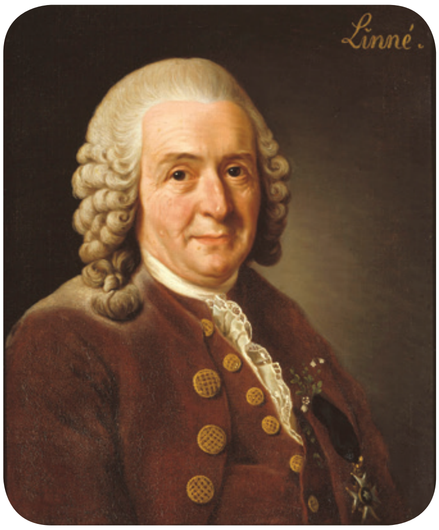


**Fig 6.** Linneaus (1707–1778) the founding father of taxonomy, realized that the Bible's "Kinds" represented higher taxonomic groups than species, and that species could freely hybridize within these kinds. Darwin knew this, but ignored it, imposing his own mistaken view of species fixity on the Bible. His "evidence for variation" thus appeared to demolish the credibility of the Bible. © Painting by Alexander Roslin, National Museum of Sweden

2. Most of the Hebrew words cited in those passages provide the identifier for its particular *min,* (although some appear to be terms for several *min,* e.g. *'anaphah'* [long-legged wading birds]). It appears that Moses chiefly has to name each *min,* not all the various members of each *min,* to convey his meaning.
3. Some of the *min* listed can be translated with more confidence. Examples include the stork and pelican (Fig. 5). These birds are mentioned elsewhere in the Scriptures, and various authors are in agreement regarding their identity in translation.
   From a biological perspective, in section 1 it was demonstrated that inter-specific hybridization within each of the stork and

pelican families provides evidence for uniting them in their respective HGs. This is consistent with the idea that the stork and pelican *min* named in the Scriptures refer to a higher taxonomic unit. It is also consistent with the notion that the members of a *min,* when they breed would reproduce with fidelity the basic ground-plan of that particular *min.*

4. The idea of "fixity of species" is nowhere to be found in Leviticus and Deuteronomy. Indeed the above arguments suggest the opposite – that variation is possible within a *min.* Both "fixity of species" and "species" were alien concepts to the Middle East culture of Moses' day, as we shall now see.

### Who needs fixity of species? Not the Bible, but Darwin!

Darwin considered that variation provided evidence for evolution. He contrasted this with the concept of fixity of species. Where did this concept arise from?

i. ***Fixity*** This sprang from the ancient Greeks, not the Bible, being associated with the Platonic world of perfect and eternal, unchanging or *immutable* ideas.
ii. ***Species*** When the Bible was translated into Latin, the Latin word for *min* chosen was "species". However, this also originates from the Greek word "idea," associated with fixity and immutability, different to the narrower meaning of the word today.

The great taxonomist, Linnaeus (Fig. 6), came to the conclusion that genera, not his species, were the important units of creation, and that the various species within a genus could freely hybridize to produce new species. In other words, they were mutable, not immutable. Many of the genera first described by Linnaeus have since been elevated to the higher taxonomic level of the family.

When Darwin was informed that Linnaeus had departed from his earlier belief that species are fixed or immutable, he seemed surprised by this. However, Darwin chose to ignore this point when he wrote "On the Origin of species." In Darwin's mind, any demonstration of variation refuted the fixity of species, and provided evidence in favour of his theory of evolution. He wrongly assumed that it was the Creation account that demanded species fixity, which he felt was contradicted by his observations of variation, when he stated *"it is inexplicable on the theory of creation why a part should be liable to variation"* (Darwin, 1872). This did not represent fairly the thoughts of Linnaeus about speciation after God's original creation by means of hybridization between species (Landgren, 1993). Thus a Greek view of fixity of species was wrongly imposed on the understanding of Genesis. The view that the Bible speaks of fixity is a straw man (Lester and Bohlin, 1986) set up in order to be easily refuted, and is perpetuated to this day.

### Conclusion

Firstly, there is sufficient data to indicate that hybridization unites groupings of animals which, for this to be so, must share the same plan of development, giving rise to a common type of body form between them. The forms do not vary gradually between one HG and its nearest neighbour. Rather, there are distinct gaps, so that the different forms are easy for even the layman to discern. These forms can be identified with the kinds or "*min*" described in various Biblical texts. This is based on examples of *min* which seem to represent a taxonomic unit higher than species, with each *min* denoting a common ground plan of form.

Secondly, the Biblical term "reproducing after their *min*" clearly suggests the ability for the ground plan to be maintained with fidelity, but crucially there is also the opportunity for variation within the *min*. This implies an in-built capacity for variation was created in the beginning, and is consistent with evidence, such as from atavisms, that ancestral reservoirs of genetic variation exist within life's forms, which recombine to generate new variations in form.

The Genesis account declares that these *min* were created from the beginning. There is evidence to support this also. For instance, the distinctive body forms of the above groupings (e.g. the skin pouch and long beak of the pelicans) are already fundamentally the same as their modern counterparts when they first appear in the fossil record (reviewed by Gish, 1995). The marked absence of proto-forms before these in the fossil record led Gould and Eldridge (1972) to propose that nature's forms must evolve in jumps, which occurred too fast to leave any fossil remains. But for advanced, complex vertebrates such as the birds, to arrive without any trace is a very big jump indeed. An alternative is that the sudden appearance of these forms is consistent with the Biblical account, which states that these forms were created in the beginning. Evidence-based reasoning appears to be pointing in this direction. ■

### Dedication.

*This article is dedicated to*
*Annika Landgren*

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# Editorial: Continued.

coding mechanisms are *not* themselves information. Given the paper, the pen, the language, someone still has to write the book! No amount of evolutionary juggling can deal with this logical impasse.

The point of these two illustrations is that evolution is both statistically and logically impossible. By contrast, the evidence of creation and the power of the creator is all around us. The reasons for unbelief are spiritual, not scientific.

Re-reading that first editorial, and the guest editorial from Nigel Cameron, the original editor of *Biblical Creation,* it is extraordinary – and encouraging – to see the same themes persisting. Our original focus and message have not changed, but clearly the numbers of Christians who have regained confidence in the Word of their creator has grown enormously, which gives us cause to rejoice. However as John Peet points out in his last editorial, we need to get the message out to the millions who are totally ignorant of the bible's teaching, for creation is an integral part of the good news: that original sinless relationship with our creator can be restored!

We are now on the verge of a new format again for this publication, for a new age of communication. In *Origins 1* we published an article on computers – now the computer has become the main vehicle of worldwide communication. The truths may be couched in a different medium, but they themselves do not change. They may have assumed a new importance in the eyes of the world (if only as something to be resisted) but their eternal significance has not changed. There may be a wholesale departure in the Western world from belief in the Word of God, but that Word still stands unchangeable, as a witness against our apostasy.

**Mike G Matthews**

unclean animals. *C.R.S.Q.* 9(2), pp. 114-123.

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## Changes for *Origins* and the Biblical Creation Society

This update concerns the Biblical Creation Society (BCS) and our sister organisations Biblical Creation Ministries (BCM) and Genesis Agendum (GA). After much discussion we have agreed that these three organisations, which share the same Biblical Creation ethos, should work together under the new name Biblical Creation Trust (BCT). The trustees of BCT have been drawn from all three organisations. Working together will allow a streamlining of resources and unity of focus that will maximise our impact.

BCT's mission is to establish Biblical Creation as mainstream in the theology and apologetics of the church. We want to equip and serve the whole church but our strategic focus will be to engage church leaders and future church leaders and students.

We believe our mission will be achieved firstly through nurturing a biblically based origins research community bringing together both science and theology. Research has always been part of the work of all three organisations but this must be developed more strategically and pro-actively. Hence, as previously announced, issue 60 will be the final edition of the printed journal *Origins*. The new website will be able to provide a far wider range of resources to a world-wide audience and more up-to-date comment on new discoveries as well as continuing to publish the range of articles currently appearing in *Origins*. (The library of many past BCS and GA publications will also be made available on the website). New video material will be developed which can readily be incorporated and disseminated through social media to a younger generation.

Biblical Creation Trust will not be a membership society, but will rely on a network of supporters. Our communication will be through a regular printed prayer letter. We would ask current BCS members to be partners in the mission of BCT through transferring their subscription to a regular gift to BCT.

The mission of BCT has never been more necessary and we believe it is the best way to develop the work started by BCS over 30 years ago. We look forward to your continued partnership in this vital gospel ministry as we go forward together.

## Single Issue Price

The price of a single issue is £5.00 plus postage.

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The BCS CD celebrates 35 years of publications, by providing pdfs of all issues of *Biblical Creation* and *Origins* in the period 1976 – 2010. Obtainable from: The Administrator, BCS, PO Box 22, RUGBY, Warwickshire, CV22 7SY, UK. (Cost £9.00 including p&p).

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